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Colin Hinson
In the village of Blunham, Bedfordshire.

H-2344
April 2004

Handbook

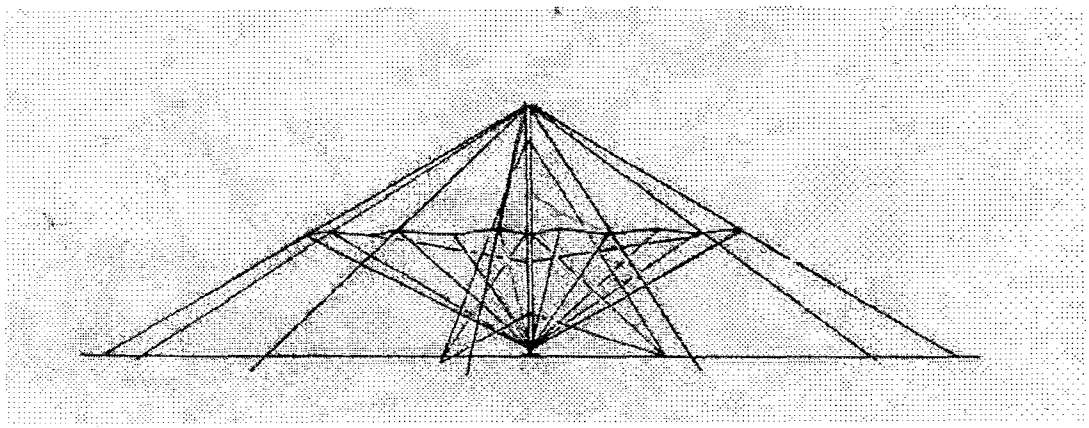
for the

Wide Band Conical Antenna

CSA Ltd Type

WB230M20VE/HLS

Covering
Specification, Installation,
and Maintenance
of the Support Mast,
Antenna,
Lighting, Earthing and
Ancillaries



CSA Wireless
Knight Road
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Kent
ME2 2AX
01634 715544

IMPORTANT

Health and Safety Warning

The installation, use and maintenance of this antenna system can be hazardous and all safety related matters identified in this handbook must be observed.

Only trained and competent personnel should be allowed to operate or work in the area of the installed antenna system.

Hazards that should be recognised and assessed are:

Heavy Components and Structures
Safe Working at Heights
Risk of Lightning Strike Whilst Erecting
High Guy Rope Tensions
RF Radiation Hazard when Powered

Operators must comply with the Health and Safety at Work etc Act or similar local legislation, as appropriate.

All safety warnings throughout this handbook should be read before starting installation or maintenance.

Contents

1 Introduction

1.1 General

This handbook describes the Wide Band Conical antenna type WB230 manufactured by CSA Ltd., specifically, the version supplied to the MoD under the code WB230M20/HLS and all the ancillary items that comprise the antenna system.

The WB range of antennas was designed in the 1970's and has been very popular with the MoD; CSA modified the standard design in the 1990's to comply with various RAFSEE specifications. One change concerned the support mast where the original lattice steel mast (type HLS) used 5mm thick angle legs; this was uprated to 8mm thick material (mast type PLM). Because these antennas have been supplied with variations in parts of the design, additional information is given in this handbook to cover the variants that may be encountered. A general view of the variants is given in the table below.

This handbook aims to describe the main components of the antenna system and how to erect the mast and antenna, and install all safety, earthing and electrical ancillaries. The typical electrical performance of the antenna is given. Maintenance routines and spares recommendations based on over 20 years service is also included in this handbook.

1.2 Variants

Antenna Designation	Antenna Curtain Part Number	Mast Type and Part Number	Notes
WB230	33378	HLS 33381	3.5t mast guys
WB230M*VE	34826	HLS 34825	3.5t and 7.5t guys
WB230/*PLM	34629	PLM 34539	The guys on the PLM mast may vary in size/strength to suit particular site conditions
* - the antenna power rating in kW appears in the product code, eg /20PLM			

2 Antenna System Description

2.1 General

CSA's WB230 range is an omnidirectional antenna intended for the operation of medium/long distance HF communications systems and is typically used for ground/air and ship/shore applications. The basic antenna covers the HF band from 2 to 30MHz and is supplied with a 1 5/8" EIA interface.

The antenna system comprises a vertical support mast, a wire antenna in the shape of an inverted cone, an earth mat buried in the ground; these are the essential components. Additionally, it is usual to have a lighting system and a climber safety system for the mast.

2.2 Mast

The mast is present to support the antenna curtain. It is of a lattice steel construction with three angle legs and round bar bracings in a Z pattern on each face. The mast is supplied in sections that are bolted together on site; all sections are welded and galvanised.

The sections are built up using a derrick pole and temporary guys are employed to provide stability to the sections during erection. Forces on the mast sections during high winds create high tensions in the guy ropes. These are resisted by the concrete anchor blocks cast in the ground around the mast; three lanes of guys and several levels, depending on the mast height and specific design conditions, are employed.

The mast sits on a ceramic insulator and the guy ropes are mostly made with non-conductive material to minimise the influence on the antenna curtain.

Two types of CSA mast may be supplied with the WB antenna, type HLS with 5mm thick angle legs and the PLM with 8mm thick angle legs. Otherwise the sections are very similar and the instructions throughout this handbook apply to both types.

2.3 Antenna Curtain

The WB230 range is a base-fed conical monopole, supported on a 34.3m base-insulated steel lattice mast. The lower (inverted) cone is formed from 21 wires and has an apex angle of 112.5 degrees, providing an input impedance of 50 ohms. The upper cone comprises 12 wires, connected between the mast head and the base of the lower cone. The antenna is tensioned by Parafil® straining ropes connected to ground from the widest point of the antenna.

All joints between antenna wires provide full articulation so that wires are not subjected to any bending forces.

The antenna is fed directly at its base from a weatherproof open-terminal adapter fitted to the incoming coaxial cable connector.

2.4 Ground System

The ground system comprises conductors and bonding to provide correct radio frequency operation of the antenna, together with the necessary conductors and ground rods associated with protection from damage by lightning and EMP.

The grounding system employed comprises of an arrangement of horizontal wires (the antenna ground mat) and grounding rods.

The ground mat comprises of 72 copper radial each 48m long and 2mm diameter, extending radially from the mast base. All radial wires are joined to the foundation block bus bar.

2.5 Lightning and EMP Protection

The base earth bus-bar together with the RF and lightning ground systems provide an excellent low-inductance EMP ground.

The lightning protection system comprises the following:

1. A 1.5m galvanised air terminal is bolted to the top of the mast, extending above the aircraft obstruction lamp unit. (Not always fitted)

2. Two steel cored copper rods, each 1.2m long, are used on the system for grounding. One rod connects the antenna base plate to ground. The other rod connects the 1 5/8" RF input flange directly to ground. Copper tape (25mm x 3mm) is used to connect both the antenna base plate and input flange to the copper rods.

3. A copper bus-bar is connected around the concrete foundation block and four copper strips are laid over the top of the base foundation block connecting the bus bar to the antenna base plate.

4. The lighting transformer used at the antenna base to relay power to the mast without compromising the insulation of the mast provided by the mast base insulator.

5. A solid galvanised steel rod forms an air gap across the mast base insulator. This gap is adjustable and is set to a gap of 9mm.

6. A spherical steel ball gap is used to protect the mast lighting transformer from lightning and is formed across the air gap on the transformer. The ball gap setting is 8mm.

7. A Josslyn type 1903 lightning arrestor is fitted between the antenna feed and the base earth bus-bar.

   The arrestor is protected from driving rain by the incorporation of a small cover that fits over the gas tube assembly.

   Arrestor type 1903-26 is used for the WB230 antenna that has a D.C. spark over voltage of 3 - 4kV, and a current rating of 150 kA. The arrestor has been chosen to operate as low as possible D.C. spark over voltage for the

4 *Antenna System Specification*

4.1 Antenna Specification

CSA Type designation	:	WB230 range

4.2 Electrical Specification

Frequency band	:	2-30MHz
Range of operation	:	1000km and beyond
Gain	:	5dBi
Input impedance	:	50 ohms (unbalanced)
Input VSWR	:	2:1 (maximum)
Rated input power	:	10/20 kW(Mean/Peak)
Input	:	1 5/8" EIA
Polarisation	:	Vertical

4.3 Mechanical Specification

The design of the antenna and its supporting mast is in accordance with Specification No.2812, dated November 1989, - Procurement Specification of Structural Aspects for Fixed and Steerable Antennas for the UK Matelo System, issued by the Royal Air Force Signals Engineering Establishment.

4.4 Antenna Curtain

The following materials are used in the construction of the antenna:

Antenna elements	:	High strength, corrosion resistant 7-strand magnesium-copper wire

Health and Safety Warning - See note below

Base insulator	:	High alumina ceramic
Rope ferrules	:	Copper
Fasteners	:	18-8 stainless steel
Straining ropes	:	Parafil® Type AC
Ground mat	:	72 radials x 48m long
Rigging screws	:	Galvanised mild steel
Mast type	:	CSA type HLS or PLM
Design wind speed	:	45m/s (HLS) un-iced
(depends on design code used)		54m/s (PLM) un-iced
		32m/s (HLS) 13mm radial ice
		38m/s (PLM) 13mm radial ice

Note: the antenna wires were supplied in cadmium copper wire before 1998. Antennas using this type of wire should be handled with gloves to prevent exposure to the cadmium, a toxic metal that is present as 1.8% of the alloy wires.

rated transmitter power. It is important that a device of the same type is used if the unit is replaced.

8. A Racal Decca type SP 003C static leak drain resistor is connected across the antenna feed point at the base of the mast to reduce static build-up on the antenna curtain.

3 Mast Lighting System

A mains isolating transformer is installed at the base of the mast, to power the mast lights. This transformer is also used to isolate the mains supply from the R.F. potential on the mast. The transformer is independent of R.F. and requires no tuning. A clear air gap between primary and secondary windings prevents leakage loss and conserves R.F. energy.

A lightning ball gap is an integral part of the transformer assembly and protects the unit from damage due to lightning. High resistance paths for the lightning ball gap are avoided by using solid bonding straps that serve to bypass union joints. These straps provide direct and positive connections to both the mast and the grounding system.

Both the primary input voltage and secondary output voltage is 240Va.c. Due to the weak coupling of the primary/secondary windings a fuse is inserted in-line with the **secondary** circuit to protect the transformer from heavy overload conditions. The primary circuit is protected at the transmitter building by a miniature circuit breaker.

Depending on the specific installation either mains or solar power sources may be used to power the lighting. For mains supply the transformer secondary connects to a junction box, which is mounted on the lower section of the mast. This shielded and watertight junction box houses the secondary winding mains fuse. The fuse is part of a DIN-rail assembly mounted internally. Suppression of transient voltages is performed by Metal Oxide Varistors that are mounted on the DIN-rail assembly. For solar powered systems the primary transformer is connected to a power source sited close to the mast.

Connection from the junction box to the mast light is made via shielded 1.0 sq.mm armoured cable that is securely fastened to the mast leg at regular intervals.

3.1 Mast Fall Arrest System

Several types of fall arrest systems have been supplied at various times depending on the legislation in place at the time. The Railok system comprises an aluminium rail running the length of the mast and fixed to stand offs from one leg on the climbing face. A trolley connected to the climber's harness is threaded on to the rail and ascends with ease but grips the rail if left to run downwards. Other systems use a rope rather than the rail so as to provide some compliance in the arresting force thus minimising the damage to the climber.

5 *Mast Specifications*

5.1 Supporting Mast

The WB230 range of antenna are usually supported on CSA's standard lattice mast type HLS or PLM. In order to avoid any electrical interaction with the operation of the antenna, the mast is guyed using Parafil® non-metallic stays. However, a short length of Norselay® steel wire rope is inserted at the lower end of each guy to reduce the possibility of damage by vandals, animals, etc.

5.2 Mast Specification

The specification applies to the HLS mast with PLM properties in parenthesis

Height	:	34.3m
Face width	:	381mm (across heels)
Leg type	:	Hot-rolled steel angle to BS4360 Grade 43A
Leg dimensions	:	50 x 50 x 5mm (8mm PLM)
Bracing pattern	:	Z
Bracing type	:	Solid round bar
Bracing diameter	:	12mm
Construction	:	Fully welded sections, site-bolted together.
Step rungs	:	One face only, 237mm pitch
Base	:	Supported on insulator unit
Finish	:	hot dip galvanised to BS 729
Section bolts	:	M16, BS4190, Grade 8.8.
Section length	:	3.81m

The capability of the mast in terms of wind, and wind with ice loading depends on the size of guy ropes used, their still-air pretension and the design code used for the analysis. Usually design codes take into account the topology of the site that can influence the local wind load conditions.

6 Siting the Antenna

6.1 General

The antenna requires a large area free from metal structures that would affect the antenna performance.

The ground should be fairly flat and level and the soil be suitable for the concrete anchor blocks, not waterlogged or loose to provide little resistance to pull out and not on rock that would make installation difficult.

Provision for power will be required at the mast base for the lighting system. Siting of the antenna or several antennas should take into account the cost of the HF power cables and the proximity of the transmitters.

Consideration of the need to limit access to the public or livestock should be made as fencing may be required. Access to the guy ropes should be restricted as the mast structure may be compromised by the loss of a single guy rope due to vandalism or animal activity. Sites with burrowing animals can provide poor resistance to anchor blocks over time. Vehicles also pose a threat to the poorly visible antenna wires

7 SAFETY

7.1 General

WARNING

BEFORE ENTERING AN ANTENNA COMPOUND, OR WORKING ON A SYSTEM, ENSURE THAT THE TRANSMITTER IS SHUT DOWN AND ISOLATED AND THAT ALL CIRCUITS ASSOCIATED WITH THE TOWER WHICH COULD CAUSE DANGER ARE ISOLATED AND GROUNDED. ENSURE THAT PRECAUTIONS ARE TAKEN TO PREVENT THE TRANSMITTER OR ANY CIRCUITS ASSOCIATED WITH THE ANTENNA BEING MADE LIVE WHILE PERSONNEL ARE WORKING ON THE SYSTEM.

7.2 Personnel

To ensure safety to deployment personnel, the following precautions should be taken:

(a) No structure shall be climbed unless current Good Condition Certificates have been inspected.

(b) Ground all base insulated masts, by adjusting each pair of lightning arresters to make contact with each other.

(c) Helmets or hard hats shall be worn during the erection maintenance or tear-down of the mast or antennas.

(d) Neither erection, maintenance, nor tear-down shall be undertaken during an electrical storm.

(e) No erection or tear-down shall be undertaken unless erection equipment being used has a valid safety certificate.

7.3 Fall Arrestor Systems

A Railok fall arrestor rail, or similar system, is provided on the CSA masts for the use of maintenance personnel whilst climbing. CSA recommend that the system be used at all times whilst climbing the masts and that only approved trolleys are used on the rail.

8 Installation

8.1 General

The basic procedure will be to:

- Plan the site, survey, mark and dig the foundation positions
- Cast the concrete foundations with embedded steelwork
- Bury the earth mat wires and install the earthing rods
- Ensure the foundations are set –plan for 28days
- Erect the mast
- Install the fall arrest system
- Install the mast lighting
- Install the antenna curtain

8.2 Groundworks

8.2.1 Preparing for Installation Work

Mast sections are packed separately; all other items are arranged in assemblies and packed in cases.
It is essential that all packing case items are identified and checked off as soon as possible to ensure that no items are missing. Checking lists will be found in the top of each case; any shortages should be noted and reported without delay.
Remove the checking lists from the packing cases and retain for future reference.

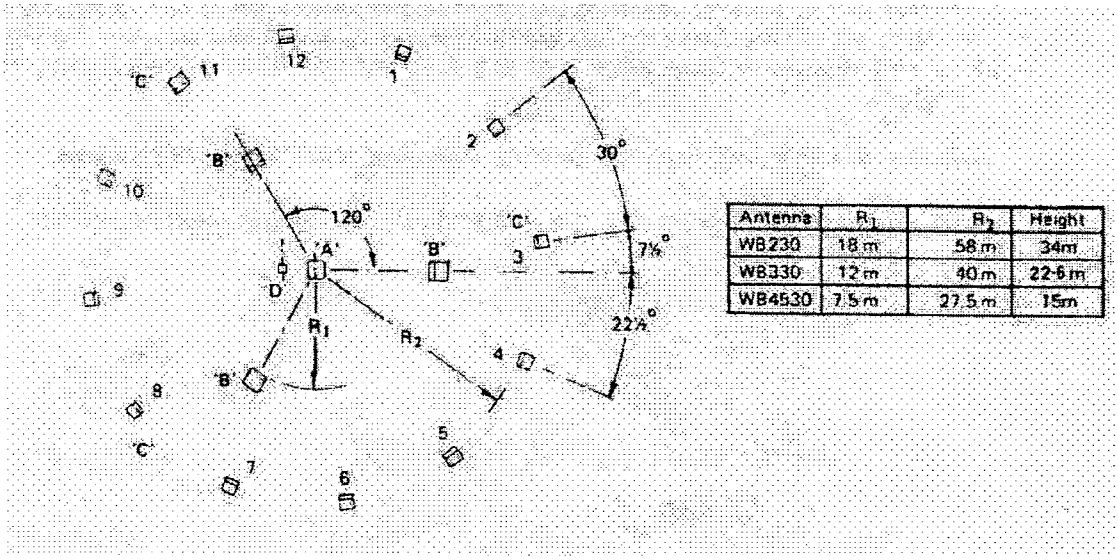
8.2.2 Marking out

The site should be carefully marked out in accordance with the dimensions given in Fig. 1. It should be as flat and level as possible, and be cleared of all scrub. bushes and trees to minimise hazards to personnel and equipment.

8.2.3 Foundation work

Having positively established the location of foundation blocks A, B and C excavations can proceed.
Excavations should, where possible, be made to the exact size and the concrete should be poured without shuttering using plastic sheeting to line the hole to prevent rapid water loss. When this is not possible, formwork of plywood mounted on timber framing should be used. After removal of formwork, the space between concrete and soil should be filled with well consolidated lean mix concrete (1:10, cement : aggregate).
Concrete above ground level should be provided with formwork of plywood mounted on timber framing. All horizontal or sloping surfaces should be finished trowelled smooth as work proceeds.
Concrete should not be inferior to a 1:2:4 mix by volume of ordinary Portland cement, fine aggregate and coarse aggregate. Aggregates of natural sand, gravel or crushed stone should be washed clean and free from any organic impurities.
Mixing of concrete should be undertaken with just sufficient fresh pure water to produce concrete having enough workability to enable it to be well consolidated and worked into corners of formwork and around steelwork. Partially set or excessively wet concrete should not be used.

The placing of concrete when frost is expected should be avoided. In very hot weather the curing rate must be slowed down by covering the concrete with damp sacking. All surfaces should be protected against damage during curing. Concrete should be allowed to stand for 28 days before the antenna is erected.



Antenna	R_1	R_2	Height
WB230	18 m	58 m	34m
WB330	12 m	40 m	22·6 m
WB4530	7·5 m	27·5 m	15m

FIGURE 1 – Foundations layout

Foundation blocks should be constructed to the correct dimensions. Dimensions given are for a safe bearing pressure in excess of 1 kg/cm^2 (1 ton/ft^2) and should be considered typical. Care should be exercised to ensure not only that blocks are correctly orientated with respect to other blocks but also that ragbolts and steelwork are correctly located within the blocks. All steelwork should be supported in position until concrete cures.

Foundation Block A is to be constructed in accordance with the steelwork arrangement given in Fig. 2.

The mast foundation template (1-75) should be used to position the steelwork in the block by aligning the template centre-line markings with the centre-lines of the block. The hairpin anchor (1-55) should be supported at the correct height by timber framing, and the ragbolts (1-45 and 1-18) should be supported as shown in detail in Fig. 2.

N.B.If obstruction lighting is also to be installed, a larger template will have been supplied. This will include 2 holes to support ragbolts 3-29 in their correct positions. These ragbolts will have been supplied either with the advanced anchor steelwork or the obstruction lighting kit.

Foundation blocks B and C are to be constructed in accordance with the steelwork arrangements given in Fig. 3. The positioning of reinforcing rods in anchor plates (1-6) is of particular importance.

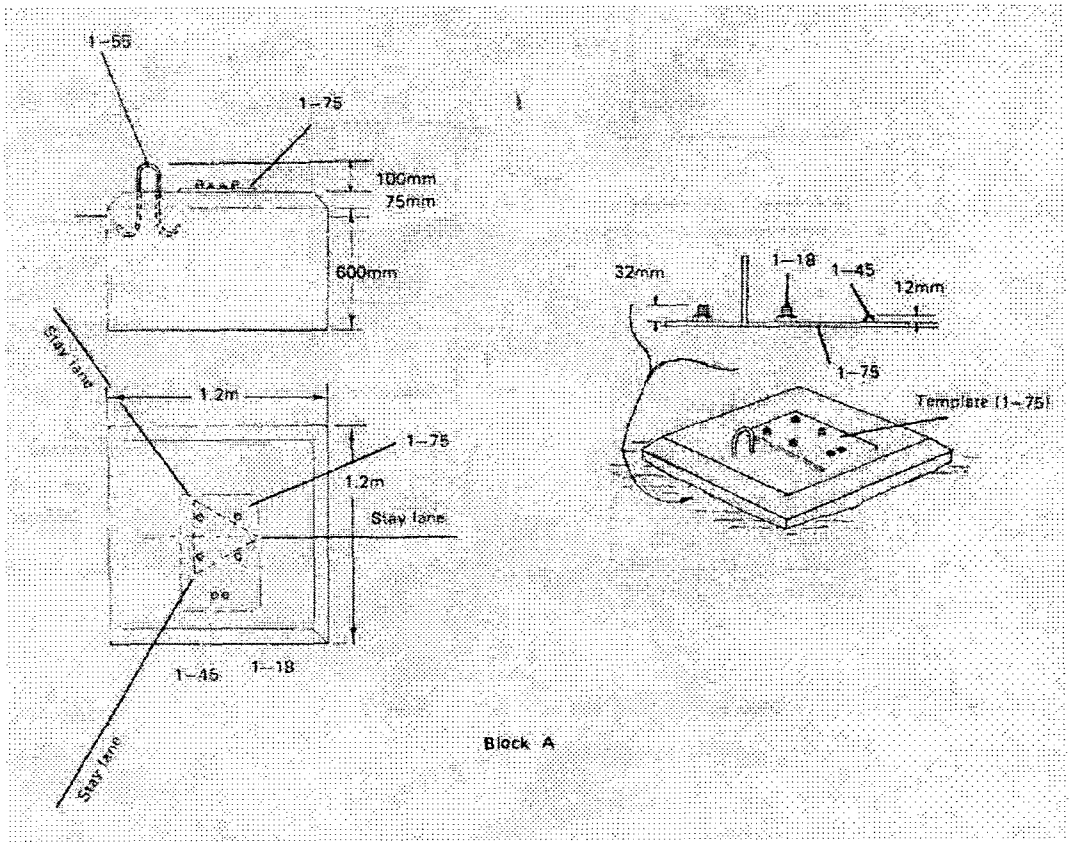


FIGURE 2 – Mast Foundation Block A

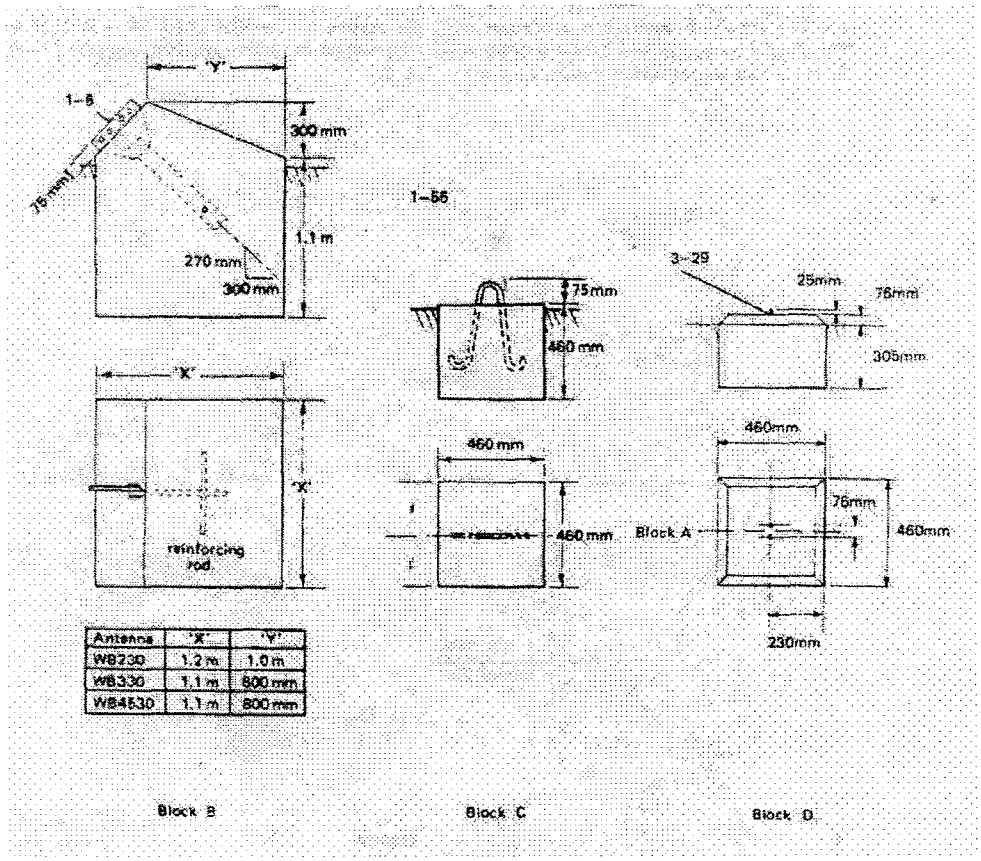


FIGURE 3 - Mast Foundation Blocks B and C

8.3 Earth Mat

The antenna base plate and the earth mat are fitted to foundation block A.
If the earth mat *is not* to be buried, it should not be assembled and fitted until after the mast and antenna have been erected, so reducing the chance of damage to the earth wire.
If the earth mat *is* to be buried, proceed as follows:

Step 1 Assemble the earthing termination assembly consisting of earth termination strip (1-65), connecting strip (1-66), bolts (1-72), and nuts (1-73), as shown in Fig. 4(a). Assemble the earth terminal connectors (1-69, 1-70 and 1-71), as shown in Fig. 4(b). The total number fitted is 16. Fit the earthing termination assembly round foundation Block A.

Step 2 Fit the base plate (1-17) over ragbolts (1-18), and the base strap connectors (1-41) over ragbolts (1-45) on foundation block A, as shown in Fig. 4(c). Twist the earth connecting strips (1-66) so that they lie flat on the base plate and over the ragbolts (1-18), as shown in Fig. 4(d). Fix them down with nuts (1-18) and washer (1-19).

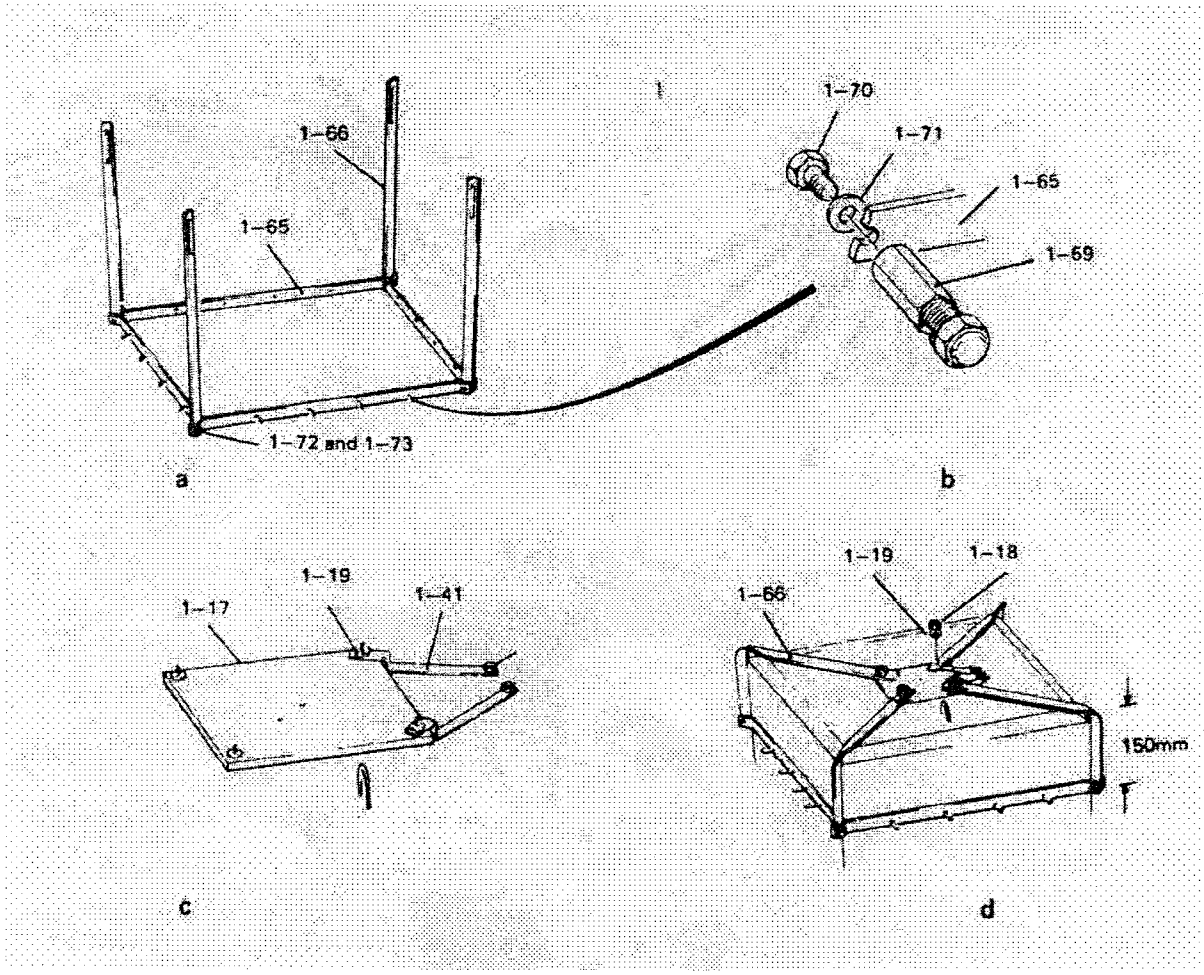


FIGURE 4 – Mast Base Block Earthing

Step 3 The earth wires (1-67) are now connected to the earth terminal connectors (1-69), as shown in Fig. 5(a). Note that the connectors near the corners of the assembly each have 5 earth wires connected to them as shown in Fig 5(b). Arrange the earth wires on both sides of the earth terminal connectors see Fig. 5(a). Fig. 5(b) shows how the earth wires should be laid out away from foundation Block A. They are to be buried to a depth of approximately 150mm

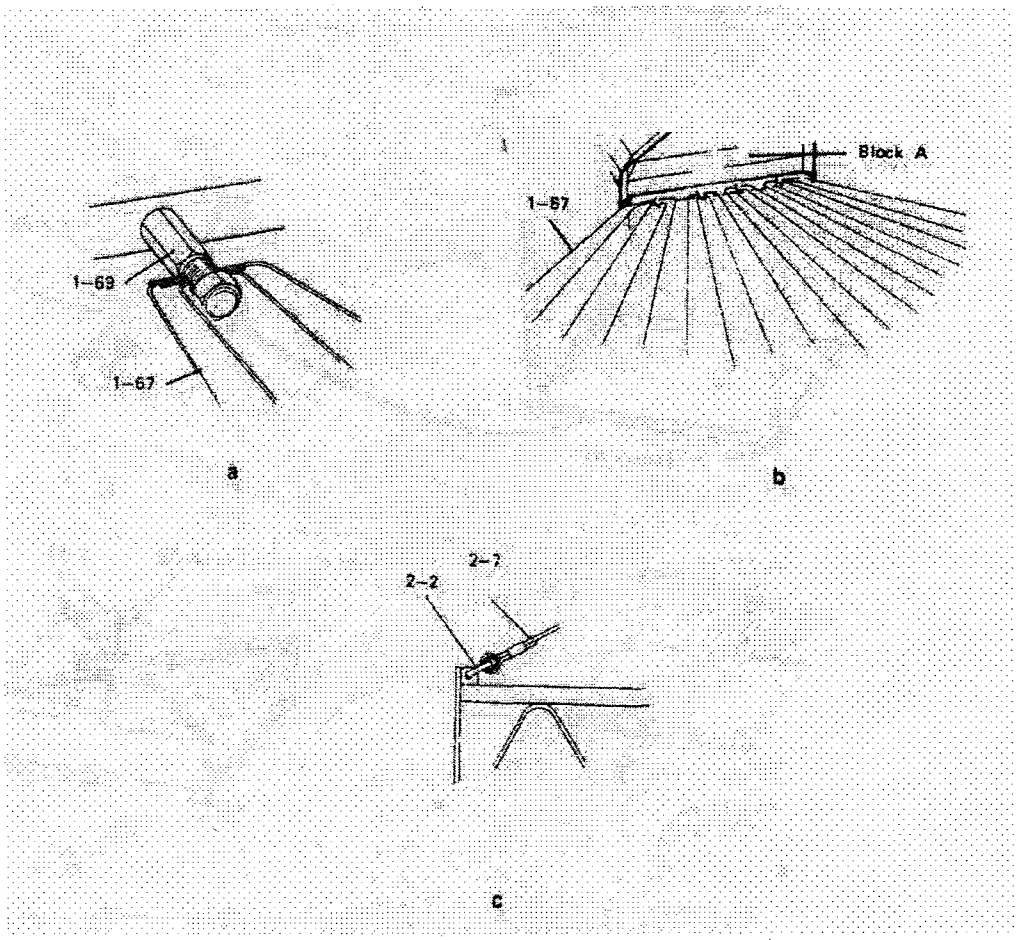


FIGURE 5 – Earth Wires / Preparing the First Mast Section

8.4 Erecting the Mast

Note: in the following text the words 'guys' and 'stays' are interchangeable and refer to ropes used to hold the mast in place.

Step 4 The first mast section should be laid on the ground near to foundation block A. Attach the temporary mast guys (2-7) to the top of the mast section by use of D shackles (2-2), as shown in Fig. 5(c).

Step 5 Fix the insulator top unit (1-23) to the bottom of the mast section, as shown in Fig. 6(a), by use of bolts (1-2), washers (1-3) and nuts (1-4). Fit packing washer (1-21) to the underneath of the insulator top unit and secure with screw (1-20).

Step 6 Fit insulator (1-22) to the base plate on foundation Block A on top of packing washers (1-21) as shown in Fig. 6(b).

Step 7 The first mast section should now be carefully lifted and positioned so that the insulator top unit, which is fitted to the bottom of the section, fits on to the insulator on the base plate, as shown in Fig. 6(c). Orientate mast legs to align with guy lanes (See Fig. 2)

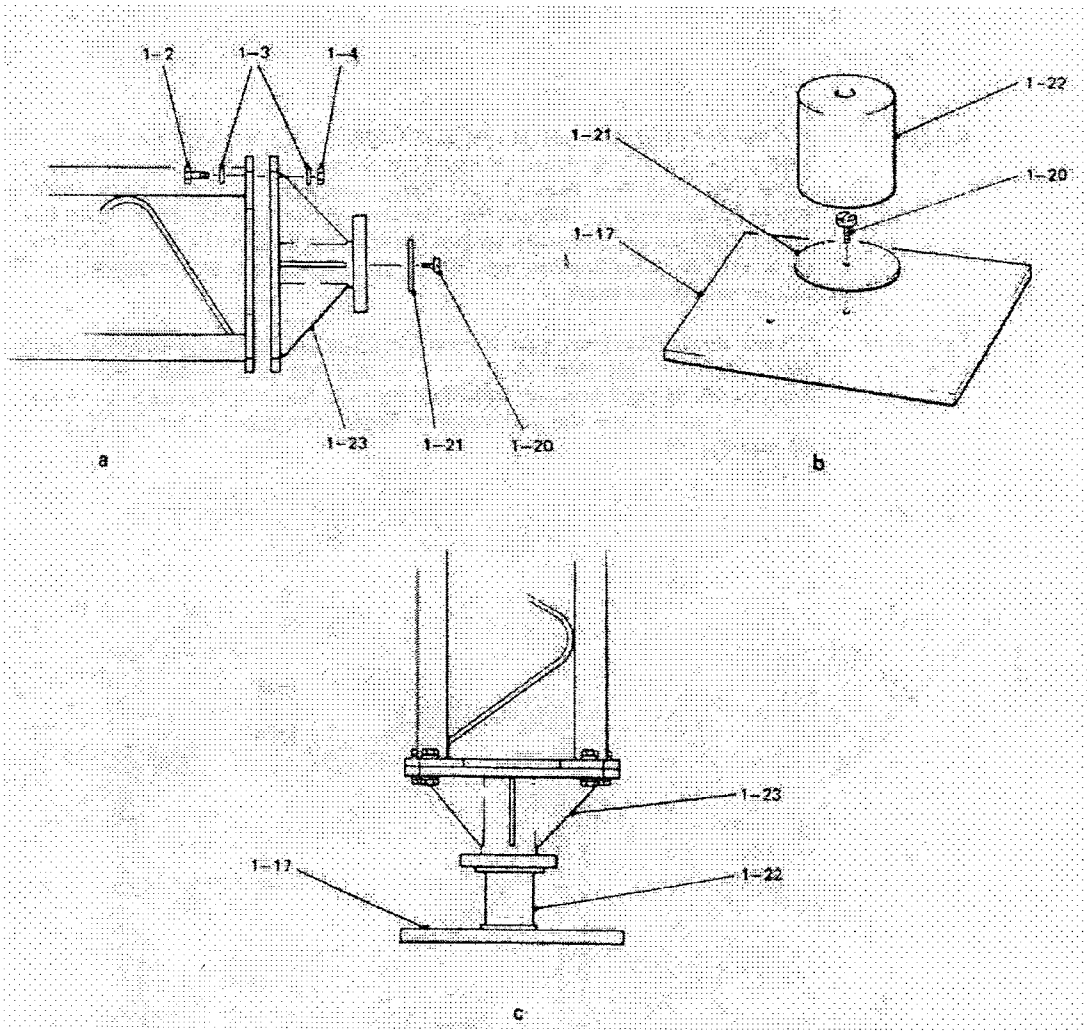


FIGURE 6 – Mast Base Insulator

Step 8 - The temporary mast guys should now be secured to the three foundation blocks, as shown in Fig. 7(a). Fully extend the rigging screw (1-7) and attach it to the foundation block. Fit a thimble (2-9) to the other fork end of the rigging screw. Pull the temporary mast wire stay (2-7) tight round the thimble and secure with Bulldog grips (2-8), as shown in Fig. 7(a).

Do not cut off any spare lengths of the temporary mast guys, because they will be required later to support higher sections of the mast. When the three temporary mast guys have been secured, tension them correctly by adjusting the rigging screws, ensuring that the mast section remains vertical. (See Fig. 7(b)).

Step 9 - Fit the lightning arrestors (1-24 and 1-25) to the insulator top unit (1-23) and base plate (1-17), as shown in Fig. 7(c). Item (1-25) should be fitted to the base plate first, and then item (1-24) fitted together with one of the antenna base fastening brackets (1-28) to the insulator top unit. After both items have been fitted, they are to be adjusted so that the rounded end of (1-24) touches the side of item (1-25). This ensures that the mast and antenna are connected to EARTH during installation work.

Step 10 - Fit the other 20 antenna base fastening bracket (1-28) to the insulator top unit, by use of bolts (1-35), washers (1-27 & 1-36), and nuts (1-26). Loosely bolt a line tap (1-74) to each bracket. Note that no base fastening brackets are fitted to the holes in the insulator top unit between foundation Block C No. 3 & 4, 7 & 8, 11 & 12 (see Fig. 1).

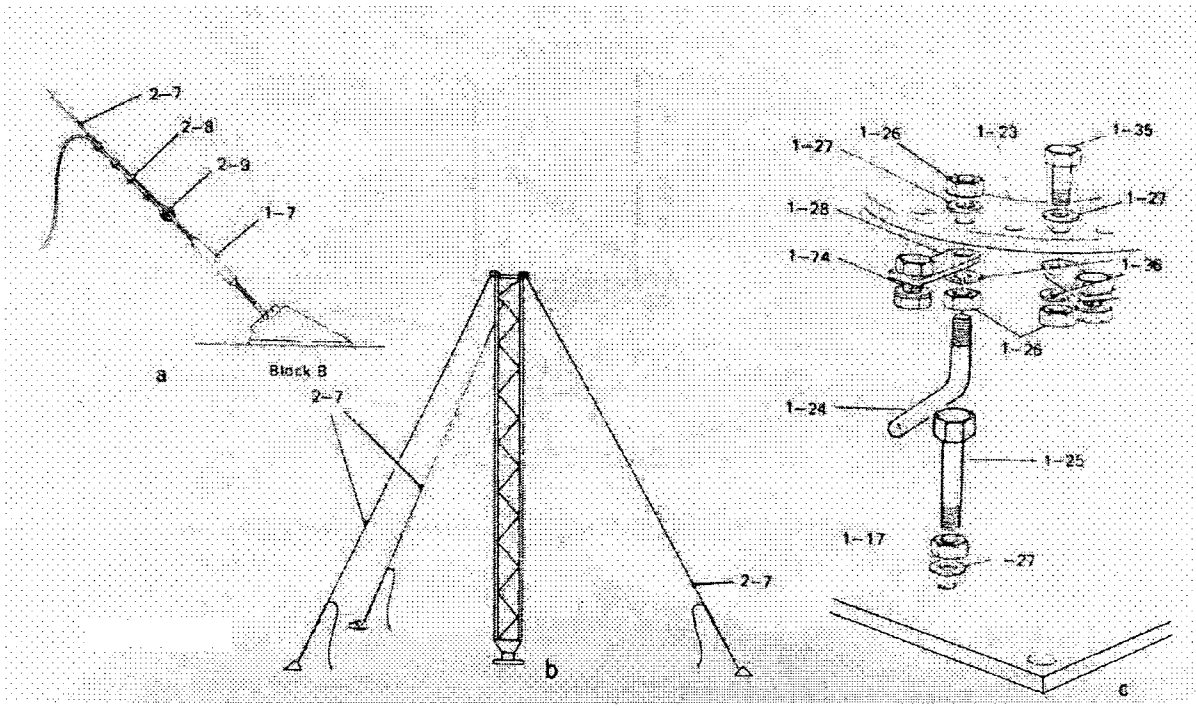


FIGURE 7 – Temporary Guys and Spark Gap

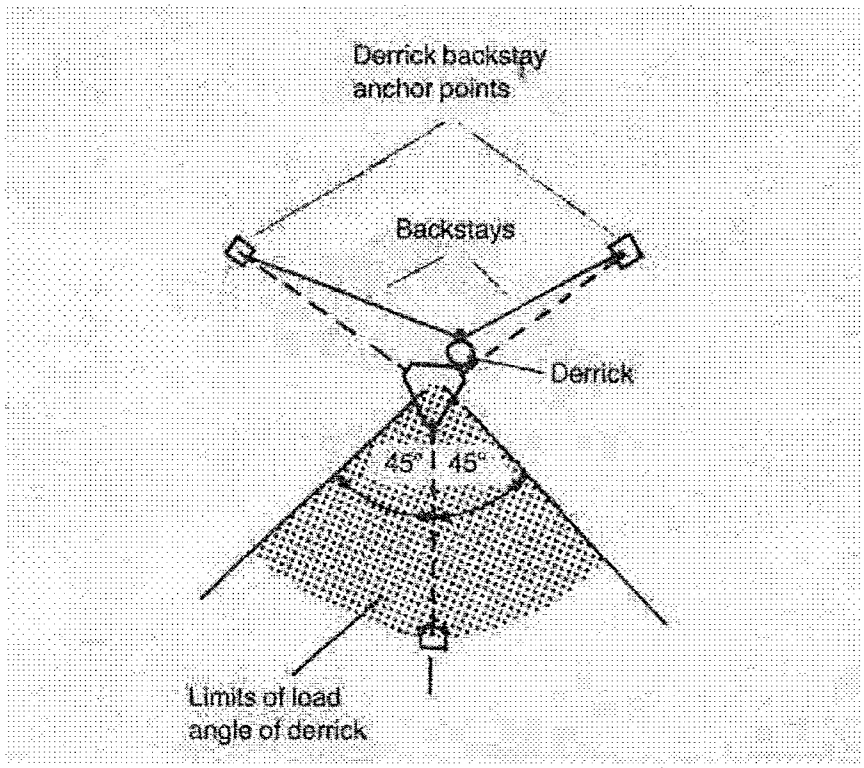
IMPORTANT

Erection Equipment

It should be noted that the erection derrick for the installation of the mast is fitted with backstays for greater safety.

The derrick pole should be positioned on the mast as described in the appropriate sections of this handbook but the backstays, fitted to the eyebolt at the derrick head, must be made-off to the mast guy anchor blocks as shown in the diagram below using the bulldog grips and shackles provided.

It is important that when lifting the mast section the load angle to derrick is restricted to within 45° each side of the mast guys on the opposite side of the mast to the temporary guys.



IMPORTANT

When using the derrick pole

- **Do not attach guys to the mast sections before lifting as the extra weight and drag may cause the derrick to be overloaded.**
- **Avoid pulling the load more than 1 metre from the face of the mast.**
- **Avoid snatching the load - always lift and stop smoothly.**
- **Never leave the winch unattended while lifting loads.**

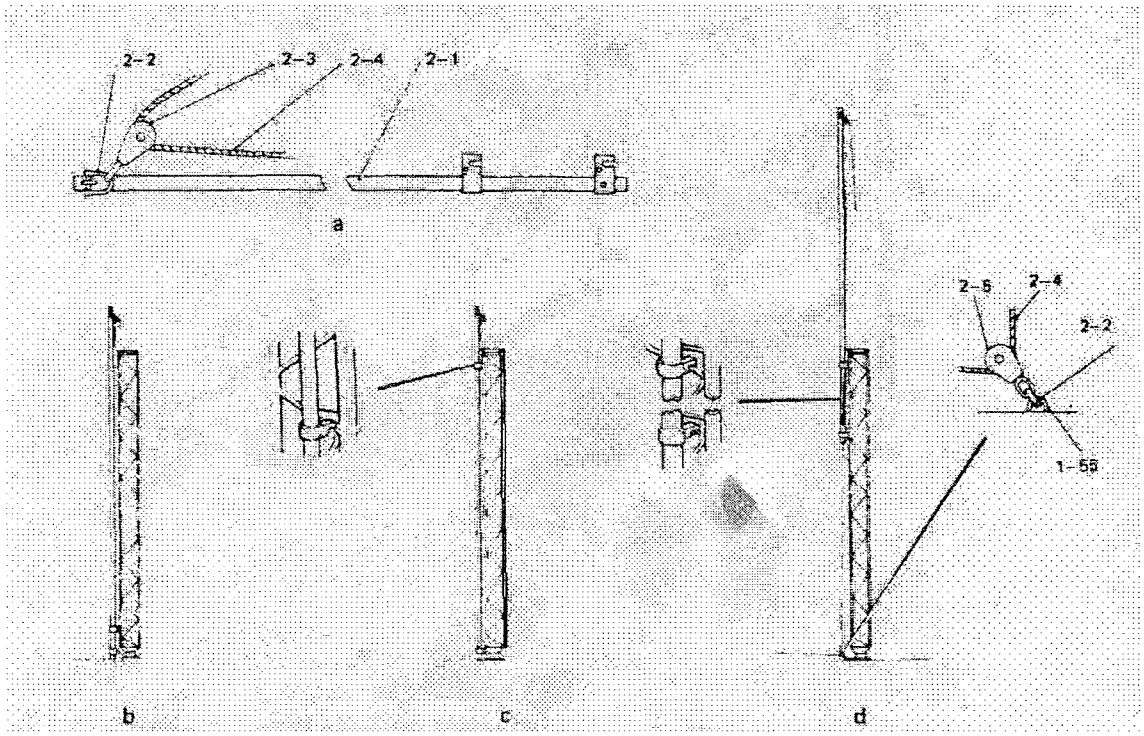


FIGURE 8 – Using the Derrick Pole

Step 11 - Before the next mast section can be lifted into position, the derrick must be secured to the first mast section. Attach the single sheave pulley block (2-3) to the derrick tube (2-1) by use of a D shackle (2-2), and thread the hauling rope (2-4) through the block, as shown in Fig. 8(a).

Lift the derrick into position beside the first mast section, as shown in Fig. 8(b). Fit the single sheave snatch block (2-5) to the hairpin anchor (1-55) in Block A by use of a D shackle (2-2), as shown in Fig. 8(d).

Step 12 -Push up the derrick sliding (upper) clamp as far as the bracing rod approx. 230mm from the top of the mast section. Fix clamp over bracing rod and check that it is securely held in position, as shown in Fig. 8(c).

With the sliding clamp held in position, push up the derrick through the sliding clamp until the derrick fixed clamp is approx. 915mm below the sliding clamp. The fixed clamp is to be clamped to the bracing rod on the mast at this point. When the derrick is in use, the clamps should be NOT LESS than two bracing rods apart as shown in Fig. 8(d). Make-off the derrick backstays to the guy anchor blocks using the shackles and bulldog grips supplied - DO NOT CUT OFF EXCESS ROPE -and lightly tension. The derrick is now ready for lifting the next mast section into position, and will extend approx. 3430mm above the top of the mast.

NOTE: When it is necessary to move the derrick further up the mast as erection proceeds, the above procedure should be followed. Ensure that when the derrick is in use, the clamps are NOT LESS than two bracing rods apart

Before proceeding further with the lifting of the mast sections, it is necessary to identify, separate and make up the various guy assemblies.

Segregate each level of 3 guys. Note that the guys for level 1 are used to secure the second mast section on the WB230 and WB330 - see figure 9 - and for the WB4530 are used to secure the third mast section.

Each tier of guys should be raised using the derrick - do not lift the permanent guys with the mast sections.

The parts list for the support mast identifies the type and lengths required for each tier of guys.

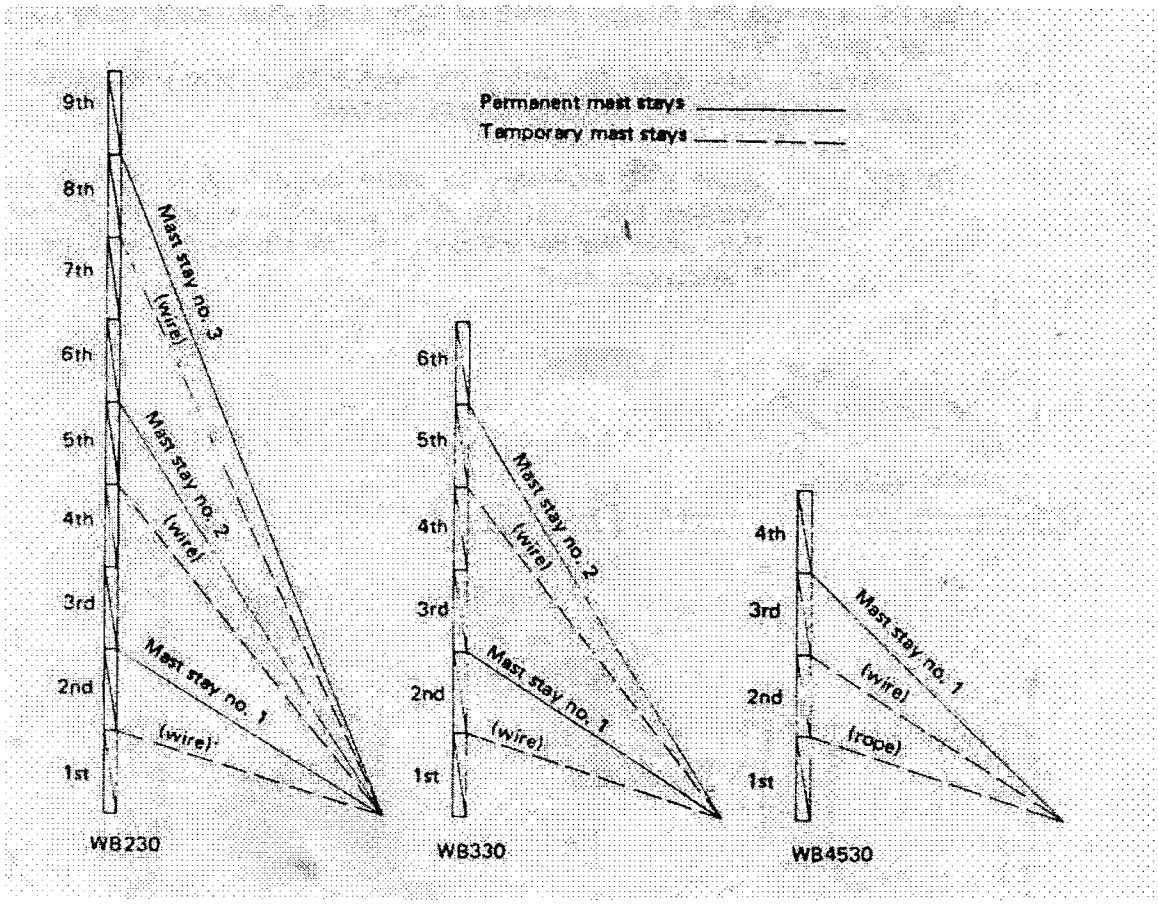


FIGURE 9 – Mast Guying Configuration

Step 13 -The upper portion of each guy is made up from non-conducting Parafil® rope, and both ends of each length must be terminated with its correct fitting. Reference should be made to Appendix E 4PS/29105 for fitting instructions.

Step 14 -The lower portion of each guy is made up from polypropylene impregnated steel wire rope (Norselay ®). Only one end of each length should be terminated at this time using a thimble and a guy grip dead end. Reference should be made to Appendix D EI-1169 for fitting instructions.

Step 15 - Fit a D-shackle to the upper termination on the Parafil ® portion and fit the thimbled end of the Norselay ® into the lower termination of the Parafil®.

Note: Check that the split pins have been properly replaced in the securing pins of each Parafil ® termination. Ensure that each tier of guys is correct and complete and segregated from other tiers,

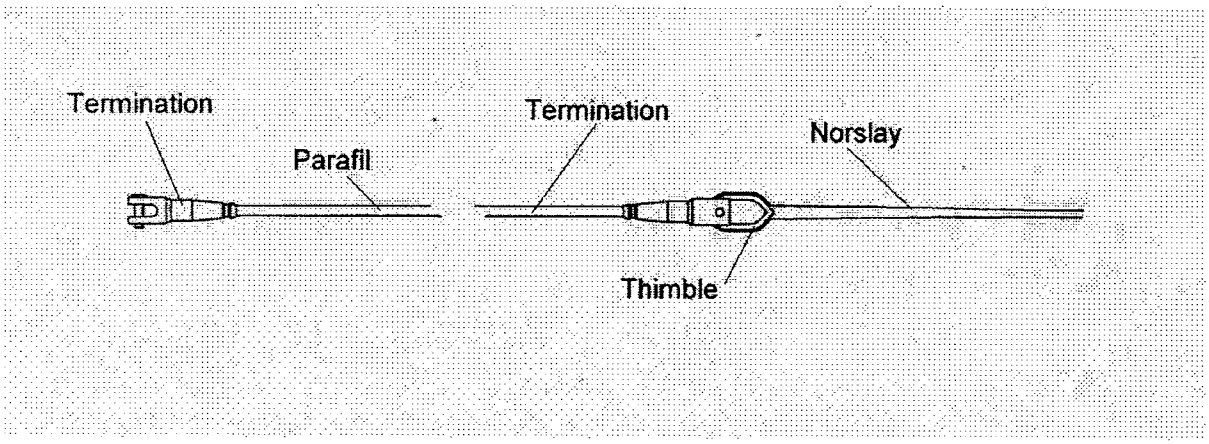


FIGURE 10 – Typical Permanent Guy Configuration

Step 16 - Each mast section is to be lifted and secured by observing the following instructions. The mast section to be lifted should be laid near the base of the mast, on the side OPPOSITE to that on which the derrick is clamped. The end of the hauling rope (2-4) hanging from the derrick is to be attached approx. 1.5m from the top of the mast section to be lifted. The holding off rope (2-6) is to be attached to the bottom of the mast section.

Step 17 - Lift the mast section while using the holding off rope (2-6) to ensure that the mast section being lifted is approximately 0.3 metre from the mast face. The mast section should be lifted so that the climbing steps are on the same face as the sections already erected. All sections must be erected the same way up, i.e. with the stay lugs at the top end.

Step 18 - When the lifted section is in position, the lower end of the hauling rope (2-4) should be secured to a lower section of the mast, so that the lifted section is supported while it is being bolted down, by use of bolts (1-2), washers (1-3), and nuts (1-4), as shown.

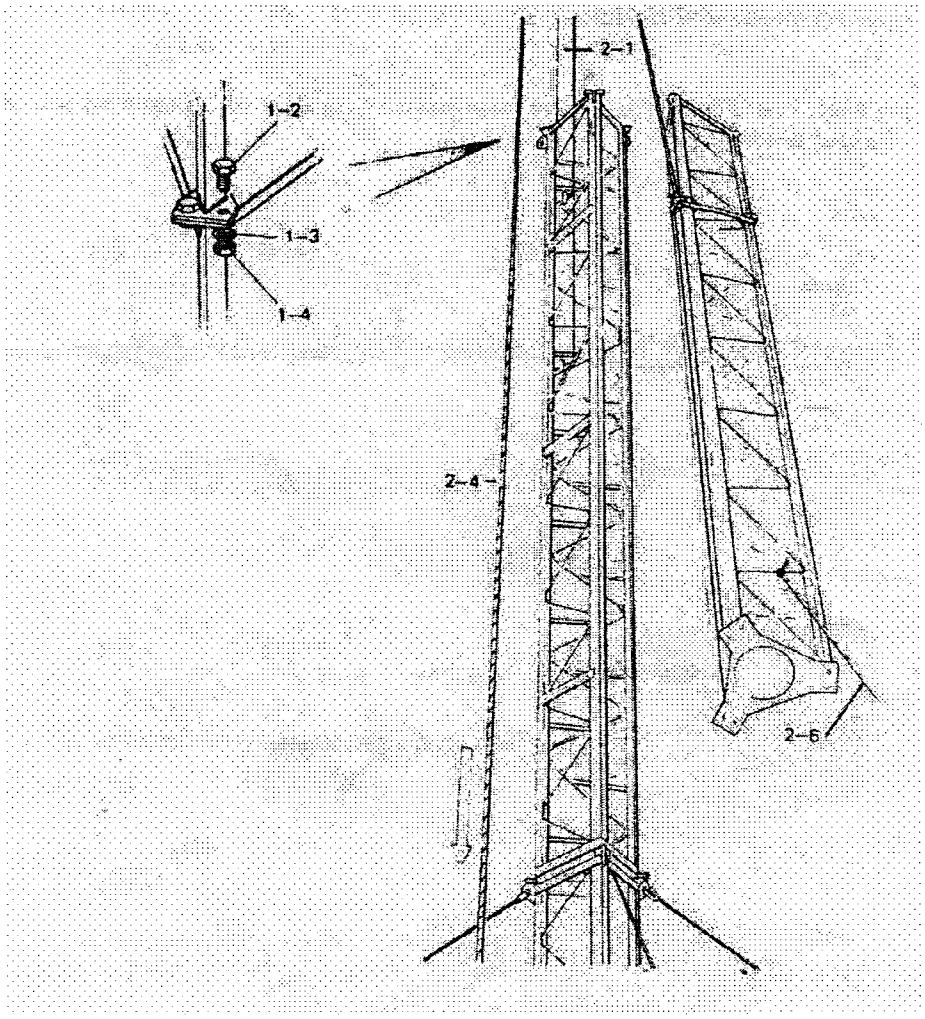


FIGURE 11 – Landing and Securing a Mast Section

For antenna systems constructed for maximum wind speeds of 160 km/h (100 mile/h) with upper guys manufactured from 3.5 tonnes rated Parafil. initial stay tensions to be applied under still air conditions are:

Antenna system	No. 1 Guys	No. 2 Guys	No. 3 Guys
WB230	305 kg	405 kg	815kg
WB330	305kg	710 kg	
WB4530	610kg		

For antenna systems constructed for maximum wind speeds of 190 km/h (120 mile/h) with upper guys(mast top) manufactured from 7.5 tonnes Parafil and other guys from 3.5 tonnes Parafil, initial guy tensions to be applied under still air conditions are:

Antenna system	No. 1 Guys	No. 2 Guys	No. 3 Guys
WB230M	405 kg	510 kg	1220kg
WB330M	405kg	1120kg	
WB4530M	1015kg		

After a set of permanent mast guys has been secured, the temporary mast guys fitted to the mast section below should be removed and lowered to the ground so that they can be attached to other mast sections which require temporary mast stays.

Step 19 - After the mast section has been bolted down, guys (if fitted) are to be paid out to the anchor blocks. Temporary mast wire guys are to be secured as described in Step 8. Permanent mast guys No. 1, No. 2 and No. 3 are to be secured in accordance with the following procedure.

Step 20 - Attach a rigging screw (1-7) to foundation Block B and hold it in line with the mast guy. Pull the guy by hand towards the anchor block, and mark the point at which the guy and fork end of the rigging screw coincide, the rigging screw having been fully extended to give the maximum amount of adjustment as shown in Fig. 12(a). Take the guy away and fit a pre-formed guy grip (1-11) so that the back of the thimble (1-29) is positioned at the marked-off point, as shown in Fig. 12(b).

Step 21 - Re-present the guy to the rigging screw and couple together, as shown in Fig. 12(c). When all the mast guys of one set have been secured, they should be tensioned by adjusting the rigging screws, ensuring that the mast remains vertical. After the guys have been correctly tensioned in accordance with the following data, spare lengths can be cut off the guys.

NOTE: If difficulty is experienced with the tensioning of stays, refer to the procedure given in Appendix A.

Antennas type WB230M and WB330M use larger size pre-formed guy grips (1-32) used on the heavy top guys as well as the item (1-11). **Ensure correct size of guy grips is used with each size of guy.**

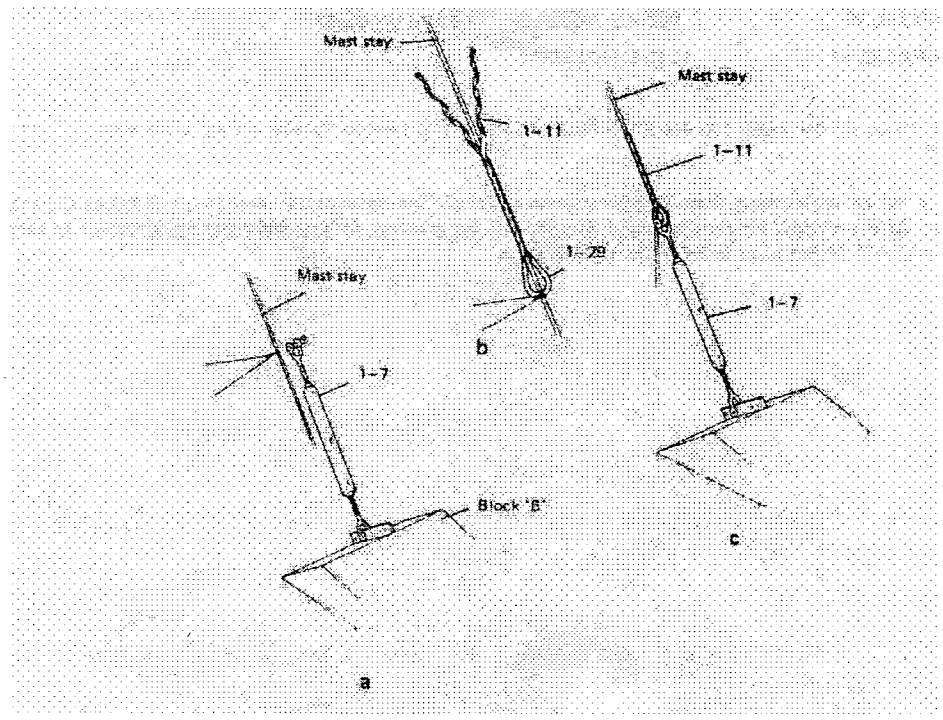


FIGURE 12 – Terminating the Guys at the Anchor Blocks

Step 22 - After the last mast section had been bolted down, the hauling rope (2-4), single sheave pulley block (2-3), and D shackle (2-2) which are attached to the derrick, are to be transferred from the derrick to the mast, as shown in Fig. 13. They should then be used to lower the derrick to the ground and to lift the mast headcap (1-33) to the top of the mast.

Step 23 - Fit the mast headcap to the top of the mast with bolts (1-34) washers (1-3) and nuts (1-4), as shown in Fig. 13. It is indented with the word "TOP" - ensure this is uppermost. Headcaps available to suit various lamp styles

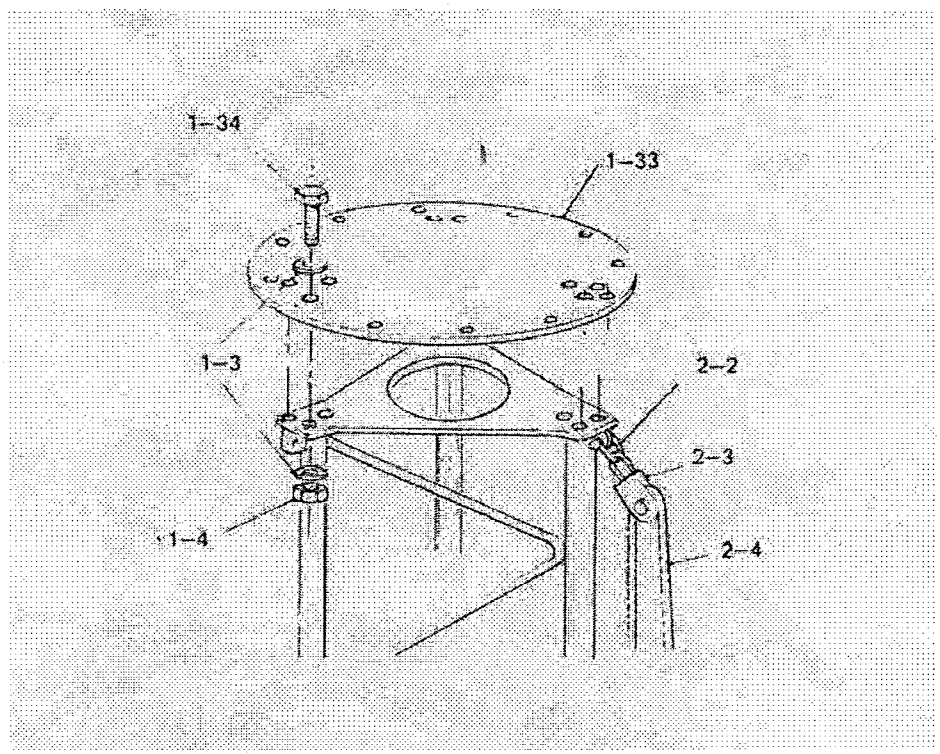


FIGURE 13 – Installing the Mast Headcap

8.5 Installing the Fall Arrest System

8.5.1 Introduction

It is recommended that a fall arrest system is fitted to the mast to enhance the safety of personnel employed to climb the mast for maintenance purposes.

The most common type of system used on the WB range of antennas is the Railok system that uses a vertical rail and a travelling trolley that locks on to the rail if left to fall downwards. This is used with a body harness and lanyard to the trolley. Upon completion of maintenance only the rail remains at the site, the other parts are stored under cover and need to be remembered when climbing of the mast is anticipated.

8.5.2 Description and Operation

The Railok safety system comprises a mobile trolley designed to run on a 2" x 1/4" (50mm x 6mm) extruded aluminium rail which is fitted to the mast leg at 1.2m intervals using special clips. Once the rail has been fitted, it is left as a permanent installation. The rails are supplied in 3.05m lengths, together with appropriate fittings, the total length to suit the installation.

In use, the operator attaches a trolley to his safety belt (BS 1397) and, as he mounts the ladder, slides the trolley onto the rail, allowing it to trail below him. He can then ascend with a minimum of restraint from the trolley. On descent the trolley slides down the rail under its own weight.

Each climber will use a trolley, but several may be in use simultaneously on the rail. Should a rest be required whilst on the ladder, the user raises the trolley above him and on releasing, with some downward force on it, it automatically locks onto the rail. The climber can then let his weight be taken by the locked trolley.

It is inadvisable to leave the trolley unsecured on the rail as vibration and wind may cause it to move down the rail. Note: A stop bolt and nut is supplied with the mounting kit to prevent the trolley from being removed from the rail, if required.

The length of the strap from the climbers harness to the trolley must be kept to a minimum in order to reduce the shock to the climber should he fall and be arrested by the Railok system. A maximum of 0.4m is recommended.

The trolley can operate just as well on an coated icy or greasy rail, although grease should be wiped off as it collects atmospheric grit and dirt which can clog up the device; ensure the trolley is kept clean, inspect it before climbing.

Where ice is present, the hardened steel locking pads on the trolley will break the ice at the locking point. If the thickness of ice is too great the trolley may not move on the rail smoothly.

8.5.3 Installation

Refer to Figure 13A. The part numbers in the following text are the manufacture's numbers.

Identify the parts as follows:

(a) Plates for joining lengths of rail consist of metal strips with four bolt holes; the top plates (1202-T) have clearance holes, the bottom plates (1202 B) are tapped. The top plates fit into the channel in the rail thus ensuring rails are butted accurately in line for free running of the trolley on the rail.

(b) Attachment clamps (1206) are supplied to fit around the leg of the structure. They should be fitted at 1.2m intervals, starting at 0.3m from the bottom end of each rail.

(c) Hexagon headed bolts with a shaped nylon spacer/washer are used to attach the rail to the structure. They are inserted through the centre of the rail so that the bolt heads is prevented from turning by the channel walls. A spacer (120B) is threaded onto the bolt before passing through the holes in the 'U' clamp and tightening with a lock nut (1210).

(d) The rail (1203 std) is supplied in 3m lengths with holes each end to join lengths together and elongated holes along the rail to provide some flexibility for mounting to irregularly pitched clamps.

Install as follows:

Step 1 Offer a length of rail up to the mast leg so that the bottom end of the rail is about 1m from the ground or the base of the ladder. (This will permit easy threading of the Railok trolley to the rail). Identify where the first clamp will fit; it should be fitted about 0.3m from the bottom of the rail.

Step 2 Assemble a bolt and nylon spacer (with the flat surface of the spacer under the bolt head) then insert the bolt through the rail so that the bolt head sits in the central channel. Slide the tubular spacer onto the bolt and offer the rail up to the leg. Put a clamp around the leg and secure it in place with the bolt through the rail. Fit a lock nut, position the rail vertical and securely tighten.

Step 3 Fit another clamp approximately 1.5m from the base of the rail, retaining it with the bolt, nut and spacers as before. Use the nearest convenient slotted hole in the rail.

Step 4 Repeat this process clamping the rail to the structure every 1.2m until the end of the section of rail is reached.

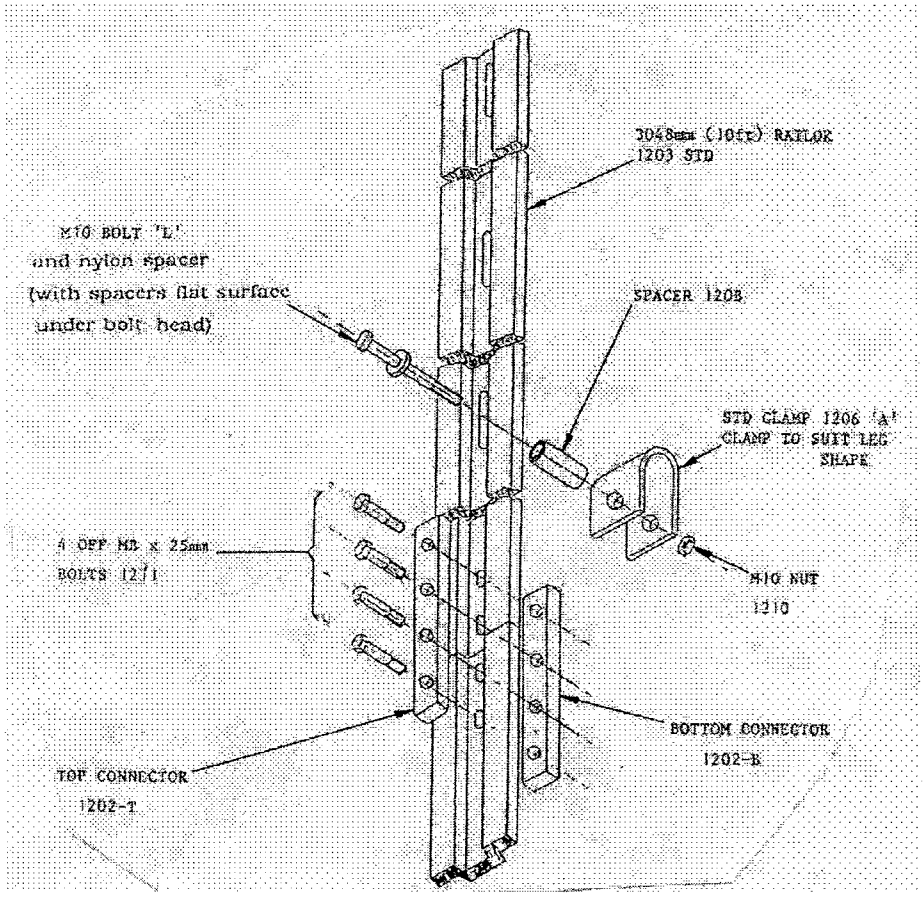


FIGURE 13A – Railok Rail Assembly

Step 5 The erector can use his Railok trolley to protect himself as he ascends by sliding it onto the rail.eg. attached to his safety belt or harness)

NOTE : THE RAILOK RUNNER MUST NOT PASS ABOVE THE HIGHEST CLAMP AT ANY TIME.

Step 6 Prepare the rail to accept the next section by fitting a pair of joint plates loosely at the top of the rail. Locate a (non-threaded) top connector plate in the channel of the rail and the (threaded) bottom connector plate at the rear of the rail. Secure the two together using two 25mm long bolts; leave the bolts loose.

Step 7 Lift another rail section and locate its bottom end between the protruding ends of the joint plates on the fixed rail. Fit another two 25mm long bolts into the remaining two holes and securely tighten all four bolts.

NOTE : THE RAILOK RUNNER MUST NOT PASS ABOVE THE JOINT OF THE RAIL SECTIONS UNTIL THE BOTTOM CLIP OF THE NEXT RAIL IS SECURED.

Step 8 Continue fitting rail sections with clamps being fitted at 0.3m, 1.5m and 2.75m spacings on each rail. Ensure the last rail does not extend more than 0.75m above the last clamp at the top of the structure.

8.6 Antenna Erection

Step 1 -Lay out the 12 upper antenna wires on the ground, radiating from the mast base, with the terminated flying tail nearest the mast. Fit a 6mm x 6mm D-shackle at each end. At the lower end attach the D- shackle to one end of a link plate. To the other end of the link plate attach the straining rope termination. See Fig 14A

Reave the thimble of one spacer wire, one lower antenna wire and a second spacer wire over a 6mm x 6mm bow shackle and fit this assembly to the centre hole of the link plate. Connect the three tails to the central lower antenna wire using a line tap-ensure that the tails are not too short and will not be under tension when the antenna is finally erected.

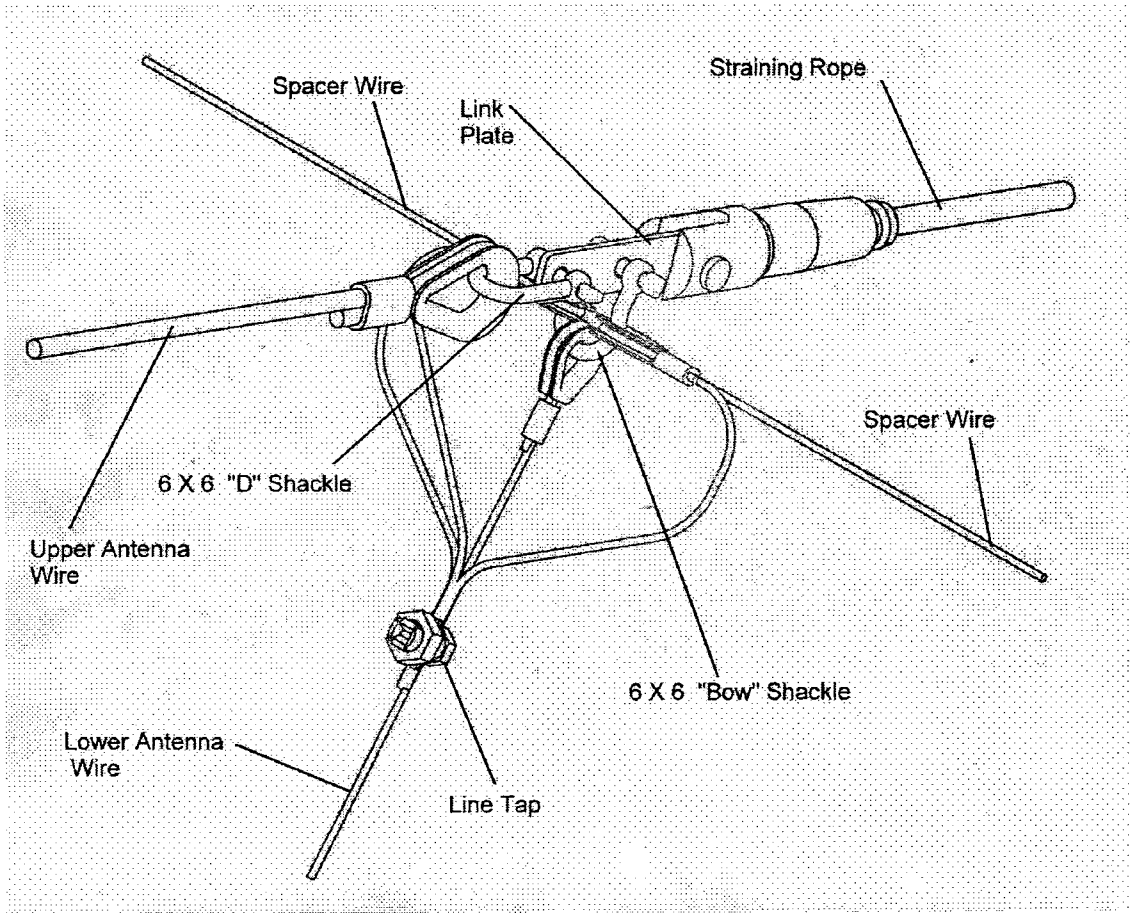


FIGURE 14A – Termination of the Wires at the Antenna Waist

Step 2 Lift each Upper Antenna Wires in turn and attach to the mast head cap using the D-shackle. The terminated tails of each adjacent pair of upper antenna wires should be secured to the head cap using nuts, screws and washers supplied. See Fig 14B

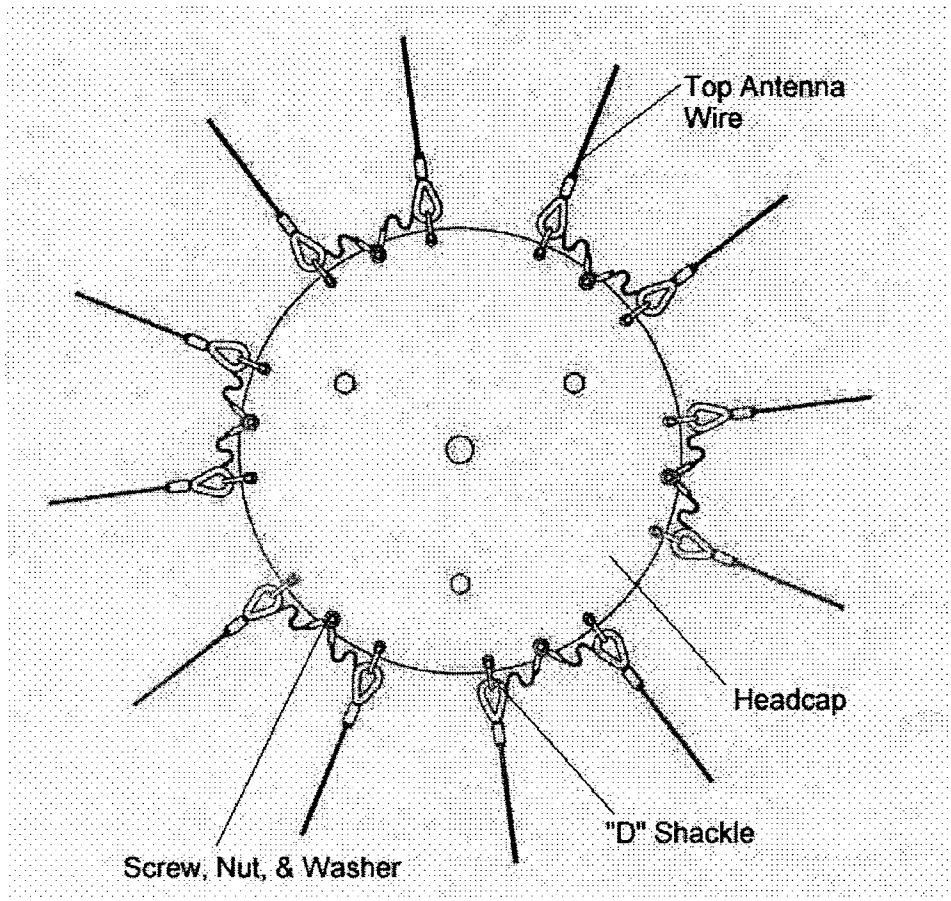


FIGURE 14B – Terminating the Upper Wires to the Headcap

Step 3 After each main antenna wire has been fitted to the mast headcap, pull out and secure each straining rope (1-54) to the appropriate foundation Block C, by use of a fully extended rigging screw (1-56), sheave (1-57), and line clamps (1-58), as shown in Fig. 15(a). Straining ropes should NOT be tensioned at this time, but should be adjusted by means of the rigging screws so that the main antenna wires hang very loosely just clear of the mast, as shown in Fig. 15(b).

Step 4 After all main antenna wires have been fixed, uncouple the single sheave pulley block from the mast (see Fig. 13) and lower to the ground

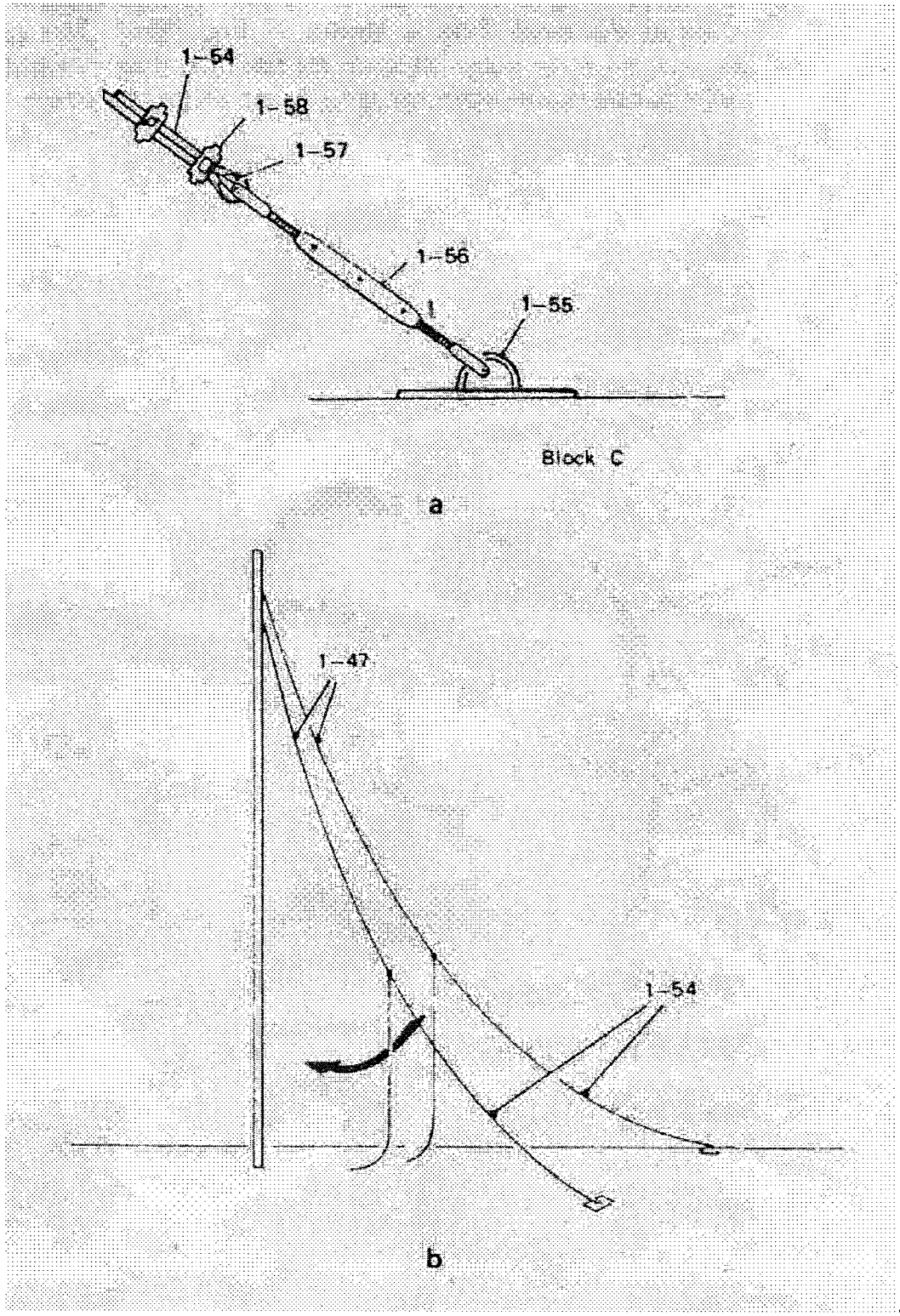


FIGURE 15 – Terminating the Straining Ropes

Step 5 -Lay out the remaining 12 lower antenna wires (intermediate wires) between the partly installed antenna wires. With a 6mm x 6mm bow shackle, reave the thimbles of adjacent hanging spacer wires and a lower antenna wire and securely tighten the shackle pin. Connect the two tails to the lower antenna wire using a line tap - ensure that the tails are not too short and will not be under tension when the antenna is finally erected.

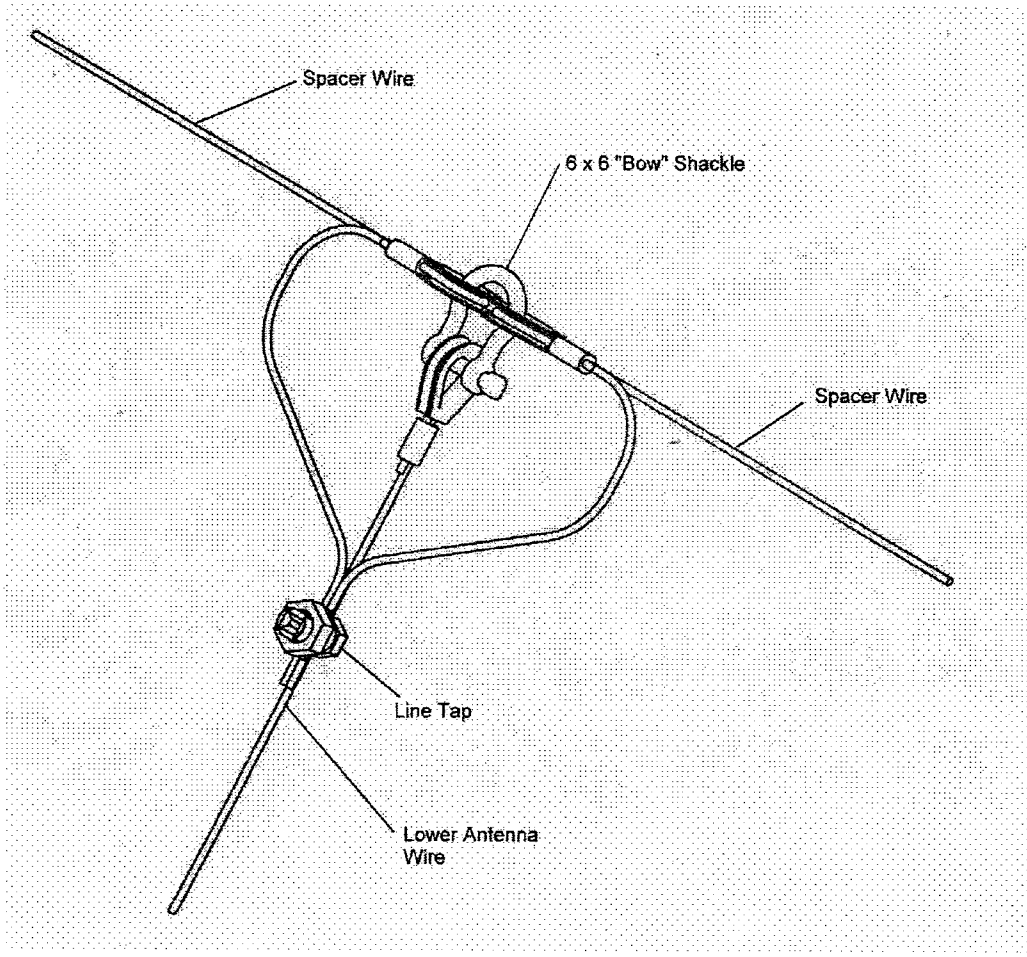


FIGURE 16 – Connecting the Intermediate Wires

Some of the main antenna wires hang down on either side of the mast stays, and difficulty in attaching the intermediate (lower) antenna wires could be experienced. To overcome this difficulty one of the main antenna wires should be uncoupled from its foundation block and be pulled round the mast stay before being allowed to fall in towards the mast. Attach the spacer wires to these lower intermediate wires as in step 5 above.

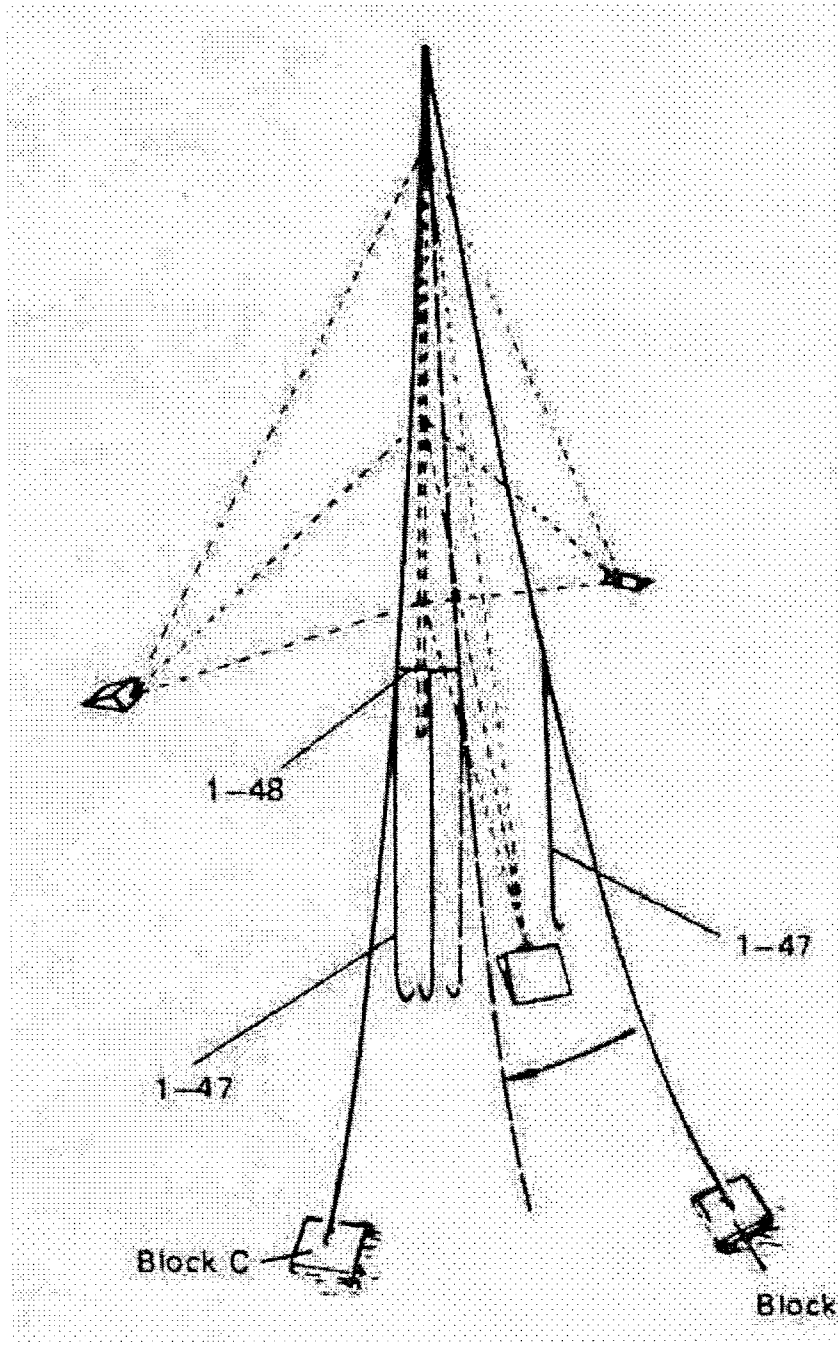


FIGURE 17A – Antenna Wire Configuration

Step 6 After the intermediate antenna wires have been assembled, re-connect and partially tighten any main antenna wires disconnected from foundation blocks, as shown in Fig. 17(a).

Step 7 Assemble a Lindaptor (1-31) and antenna wire fastening bracket (1-28) to each mast leg using a bolt (1-35), washer (1-36), and nut (1-26). See Figure 17B. Fix a line tap (1-74) to each bracket. The Lindaptors are to be fitted at 12m above ground level.

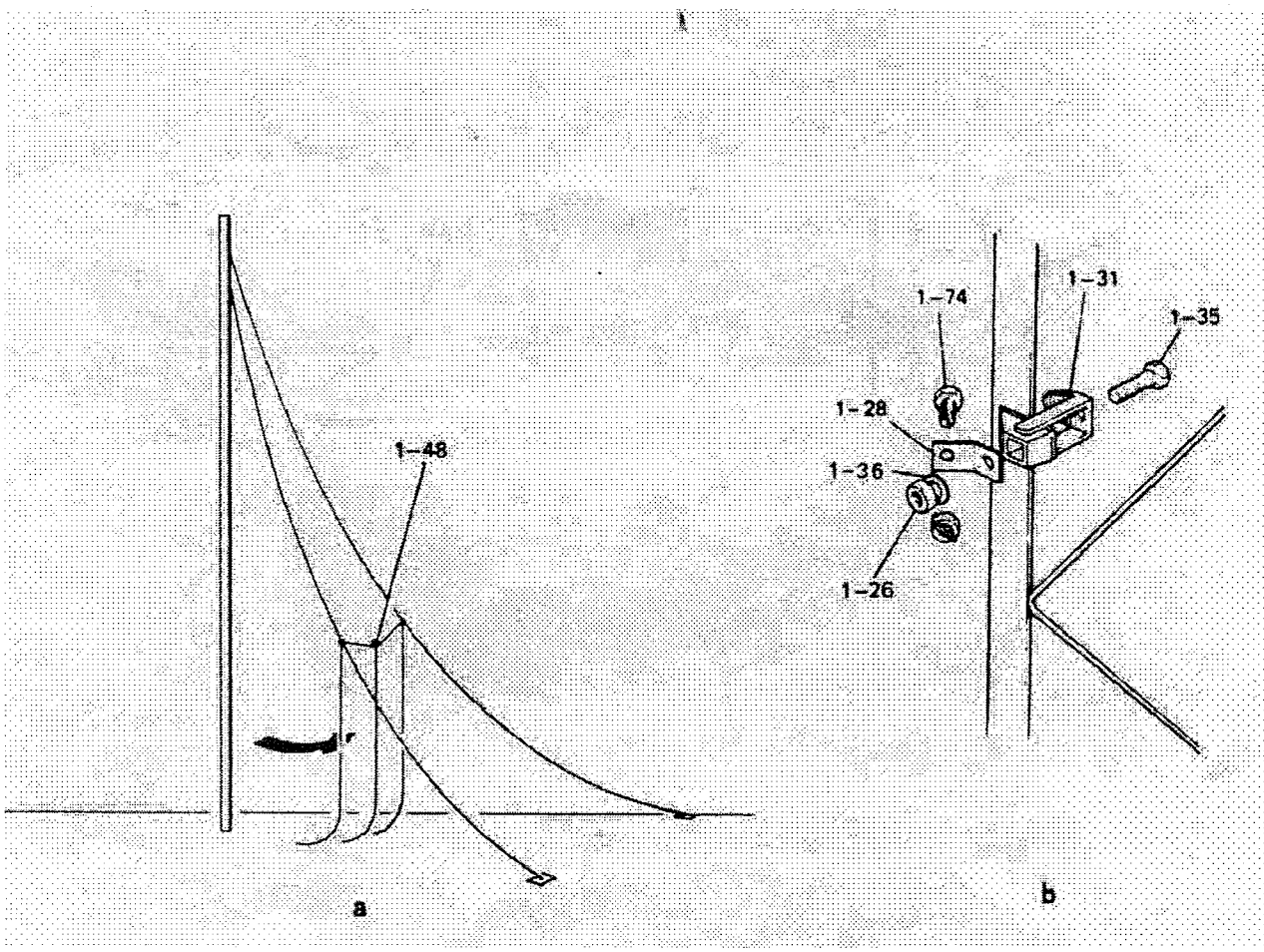


FIGURE 17B – Fitting the Lindapter Brackets

Step 8 The straining ropes (1-54) should now be progressively tensioned to produce an evenly shaped top cone. The tension should be applied to opposite wires at the same time to maintain the position of the mast head. Tension should be applied by one man pulling down on a straining rope each with a 3rd man making off the lower end of the rope as shown in figure 15a, with the rigging screw fully extended.

Step 9 Three of the intermediate wires should be taken to the Lindaptor fittings positioned under Step 7 above; these should be the intermediate wires adjacent clockwise to the mast stays. These wires are secured to the fittings as shown in figure 18a and the tails left uncut in case a further adjustment of the Lindaptor position is necessary during electrical testing. The tail should be cut off once the antenna had been tested and found to be within the V.S.W.R. specification.

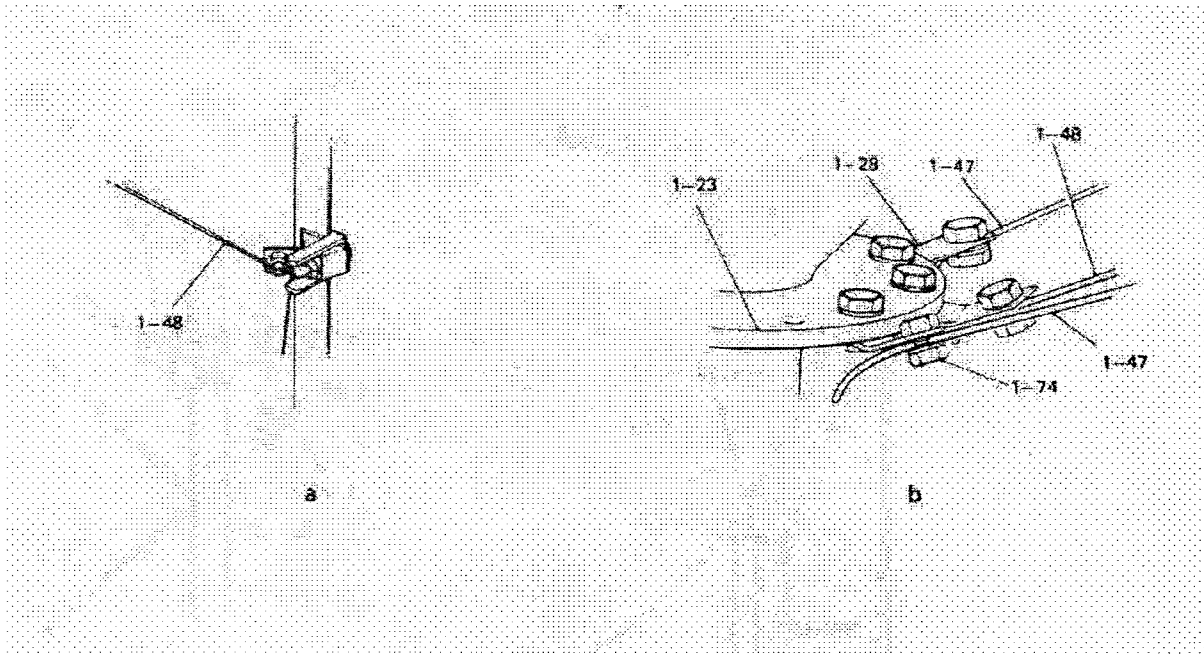


FIGURE 18 – Antennas Wire Connection to Lindapter and at Mast Base Plate

Step 10 Connect the appropriate main antenna wires, (1-47) to alternate line taps on the insulator top unit fastening brackets, as shown in figure 18b. The wires should be tensioned lightly by hand. It will be noted that considerable wire is left and this should be cut off 150mm (6") below the lower fastenings. Connect the remaining intermediate wires (1-48) to the other line taps on the insulator top unit fastening brackets, as shown in figure 18b. Again, these wires should be cut off 150mm (6") below the lower fastening. It is now necessary to apply tension to these lower antenna wires so as to produce a regular cone shape and it is recommended that the main antenna wires are tensioned to 20 kg. (44 lb). The intermediate wires should be more lightly tensioned, 7-10 kg (15-22 lb), as these are not supported by the main straining ropes.

Step 11 The tension in the straining ropes should be approximately 90 kg. (200 lbs.) It is recommended that one straining tope is tested, as shown in Appendix B, to assess the tension; if it is in the order of 90 kg. (200 lb) the installation can be completed by wiring the rigging screws and covering them with Densotape and then tightening of the line clamps on the straining ropes and the lower antenna wires. All antenna wires should now be cut off immediately below the line taps. See Fig 18b

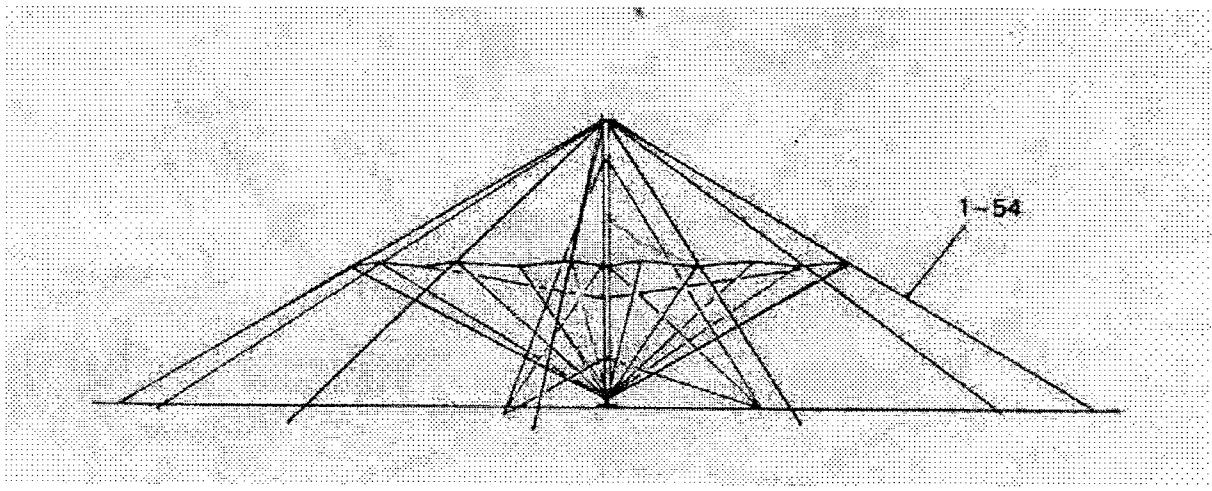


FIGURE 19 – The Finished Antenna Shape

Step 12 If lighting equipment is required proceed in accordance with Section 7.7.

Step 13 -If an unburied earth mat is required in the installation, proceed in accordance with the instructions in Section 7.3

Step 14 -Fix the open wire adapter support bracket (1-37) to the base strap connectors fixed to ragbolts (1-45) and secure with washers (1-27) and nuts (1-45).Fit the open wire adapter (1-38) and connector (1-42), and couple to the insulator top unit (1-23), as shown in Fig. 20. To ensure that a satisfactory connection is made discard spring washer (1-36) under the insulator top unit and use plain washers (1-64). See drg no 2/34548 for fitting of lightning arrestor & static drain resistor if supplied

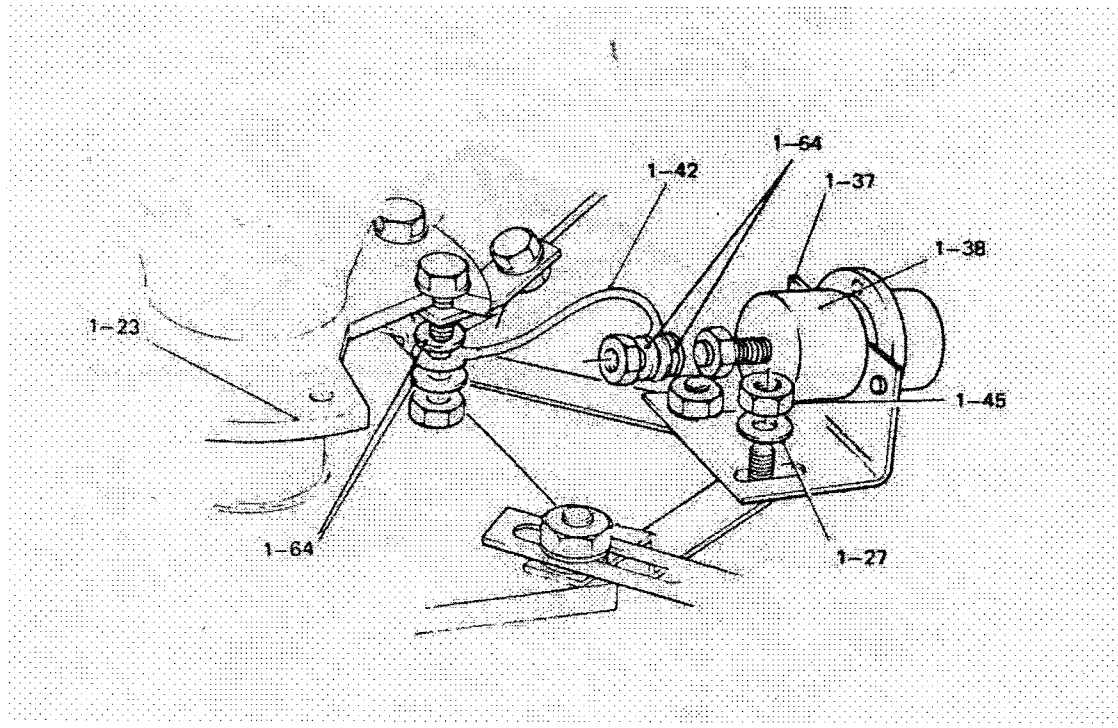


FIGURE 20 – Fitting the Input Connector

8.7 Obstruction Lighting

Two ragbolts are required in block 'A' to secure the transformer lower mounting bracket. These may have been cast in place during placement of the foundations. If not, determine the required positions and drill holes 25mm diameter by 150mm deep in Block A. Set the bolts upright and pour quick cure resin into the cavities. Allow sufficient time for curing before proceeding.

Step 1 -After erection of the mast has been completed, bolt the obstruction light (Neon, as standard or twin filament) to the mast headcap using the bolts supplied with the fitting. Screw the cable gland into the obstruction light and allow the cable to hang down inside the mast structure, as shown in figure 21.

Step 2 Clip the cable to the leg of the mast using cable clips at 1 metre intervals.

Note. Continue installation of antenna and on completion finish assembly of lighting as follows and as shown in drawing 1/10187

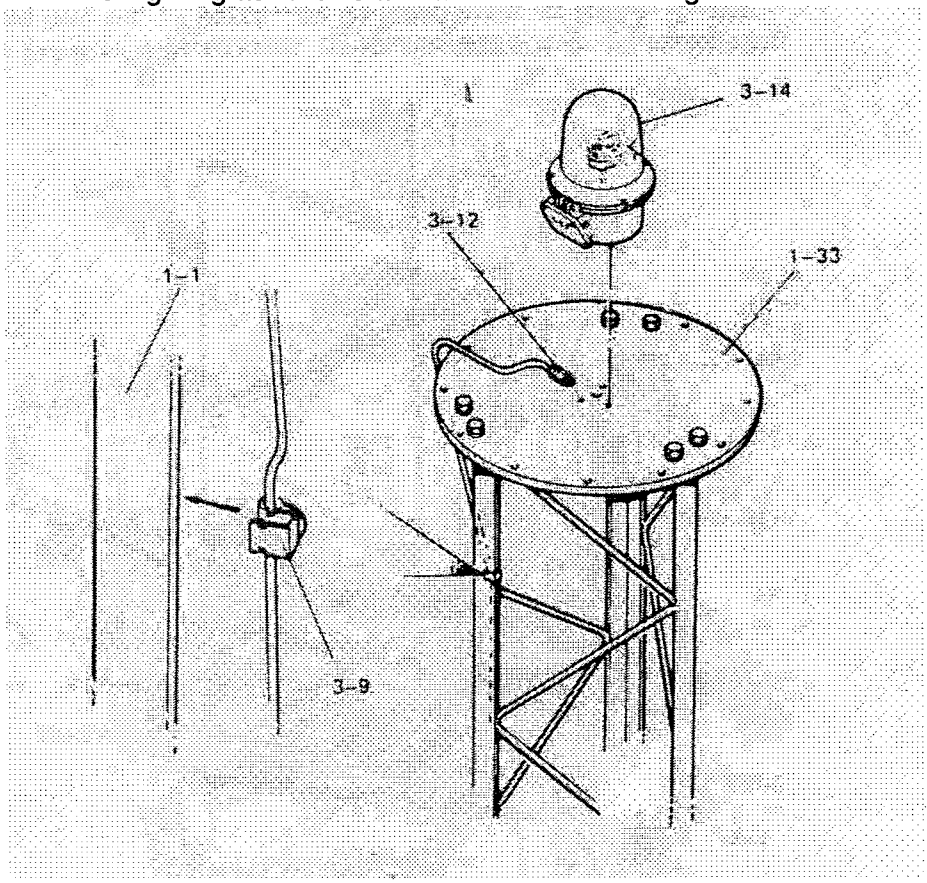


FIGURE 21 – Mast Head Lighting Lamp and Cable Fitting

Step 3 -Fix the transformer lower mounting bracket on to foundation Block A ragbolts using washers and nuts.

Step 4 -Using two V-bolts secure the transformer upper mounting bracket to the mast leg at approximately 370mm to the bottom edge of the back plate from the top of block 'A'.

Step 5 -Assemble the fuse unit to the support straps and attach this assembly to the mast leg using the V-bolts supplied at about 900mm above the block A on the same leg as the upper bracket.

Step 6 -Connect the cable from the mast head obstruction light into the fuse unit as shown in the wiring diagram in figure 23, and fit the Varistors as shown.

Step 7 -Connect one end of the longer cable of the remaining two into the fuse unit (see figure 23), and pass the other end through the upper spigot. Do not tighten the gland.

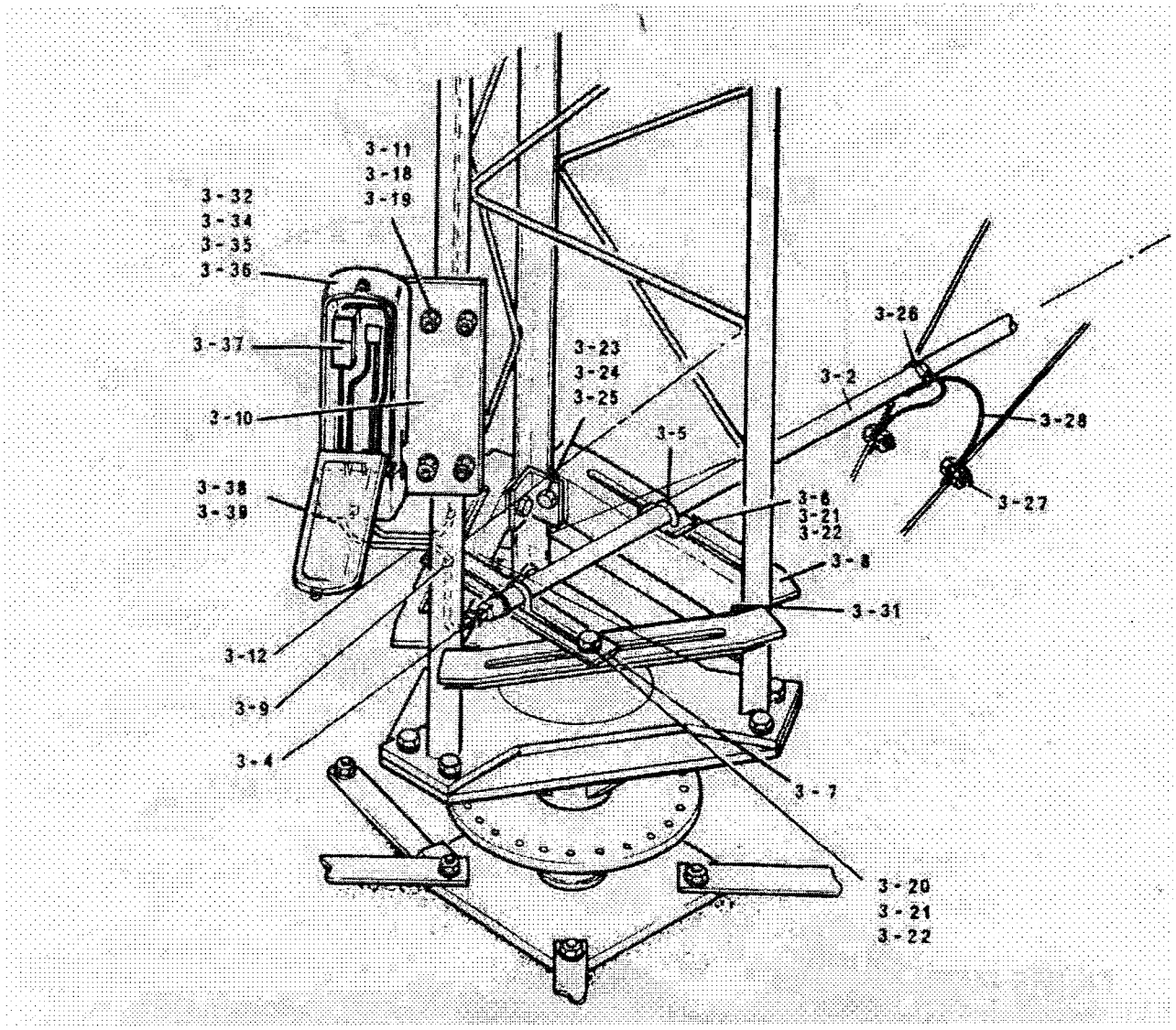


FIGURE 22A – Lighting Transformer Support Tube and Fuse Box Mounting

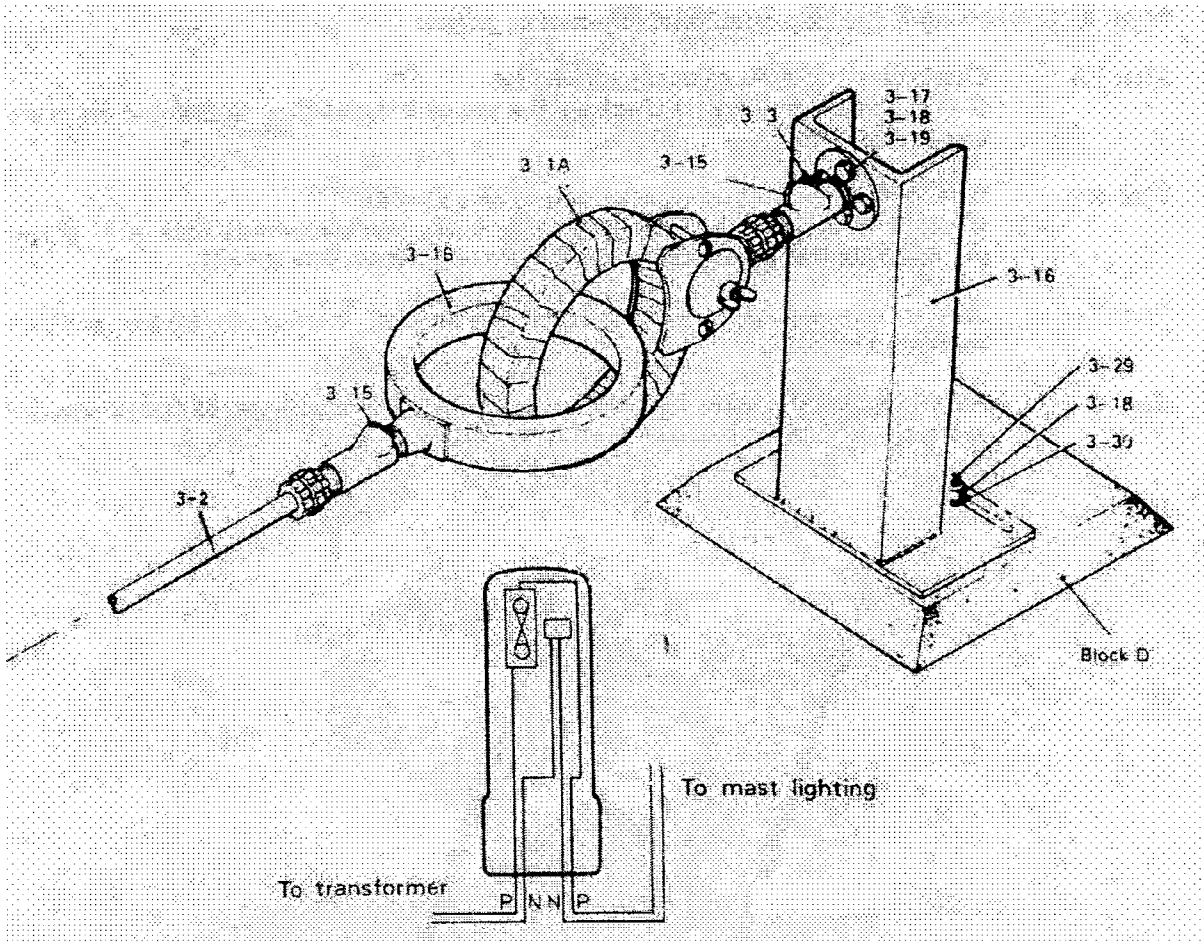


FIGURE 22B – Lighting Transformer and Fuse Box Wiring

Step 8 Pass one end of the remaining cable through the lower spigot. Do not tighten the gland.

Step 9 Using terminal blocks, connect up the wires of the transformer secondary ring with the two tails from the longer of the two spigots. Then screw the spigot fully home into the coupling on the secondary ring.

See Appendix H EI-1022 for transformer wiring instructions.

Step 10 Repeat Step 9 using the shorter spigot with the transformer primary ring.

Step 11 When both spigots are secured, tighten the two cable glands on the spigots fully.

Step 12 Refer now to EI-1022 for other instructions concerning the transformer. Then carefully supporting both rings of the transformer, attach the longer spigot to the upper mounting bracket using the U-bolts supplied - do not fully tighten at this stage. See figure 22B.

Repeat this for the primary ring.

Step 13 Adjust the positions of both spigots to ensure that the transformer rings are at right angles to each other and that the rings pass through the centre of each other. The secondary ring should be vertical.

Pass the earthing braid of the secondary ring between the U-bolts and the upper spigot, and the braid from the primary ring between the lower spigot and U-bolts.

Secure both spigots by tightening the U-bolts.

Step 14 Shorten as necessary the lightning ball support arms on the transformer and set the ball gap.

Step 15 The cable tail from the lower spigot should now be fitted to the junction box which itself should be secured to the side of the lower mounting bracket. Trim the tails as necessary.

Step 16 If the mains input cable is not yet to hand, seal the input opening of the junction box with the plug supplied.

Step 17 Attach the two copper connecting strops to the upper spigot using the worm drive clip - ensuring that the strops are in contact with the spigot. See figure 22A.

Attach the other ends of the strops to adjacent antenna wires using line taps. Tension as necessary to prevent intermittent contact of the wires and the secondary ring. Ensure that contact cannot be made to the side of the primary transformer ring.

8.8 Antenna Testing

Complete electrical testing of the antenna and other electrical systems in accordance with Appendix C before powering up the antenna.

8.9 Site Completion

When all erection work has been completed, proceed as follows:

Step 1 -Check finally that the mast is truly vertical. If considered necessary, re-check by the use of two theodolites. Check that stays are evenly tensioned.

Step 2 -Wire lock each rigging screw with locking wire (1-78). Grease the exposed threads, inspection holes, and tensioning hole with grease (1-76). Wrap the rigging screws and threads with Denso tape ·1-77), see figure 23.

Step 3 -Tidy up site around the mast, remove packing cases, erection equipment, and any surplus materials.

Step 4 - Finally, adjust the lower lightning arrestor (1-24) so that a gap of 15mm approx. exists between the radiused end and item (1-25). See figure 7.

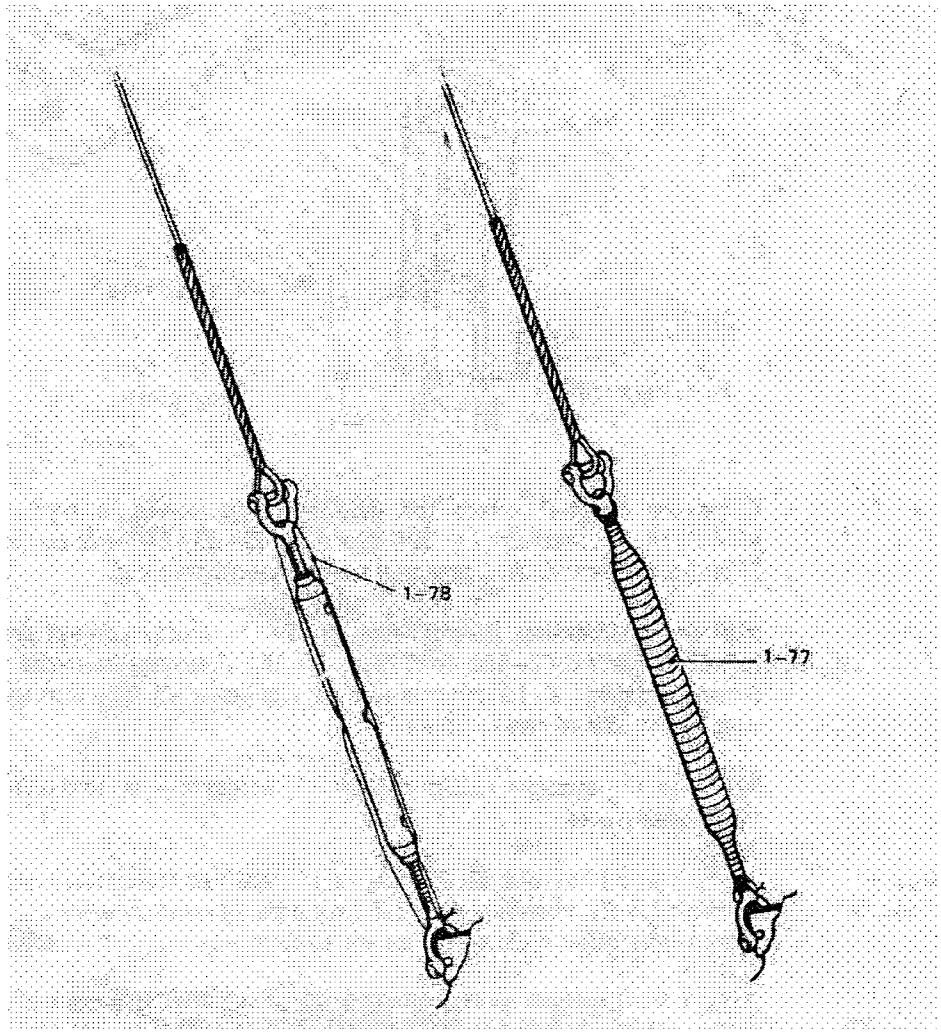


FIGURE 23 – Finishing off the Rigging Screws

9 MAINTENANCE

9.1 Introduction

Included in this handbook as Appendices F & G, are copies of CSA Limited maintenance leaflets for MF antennas and guyed masts that should also be referred to.

MF antennas - EI 1107
Guyed masts - EI 1112

9.2 Periodicity

Maintenance should be carried out yearly for a normal environment, or at shorter intervals if the environment is excessively damp or the atmosphere corrosive. Defects should be rectified as found.

NOTE : BEFORE ANY MAINTENANCE IS CARRIED OUT, ALL POWER MUST BE REMOVED FROM THE ANTENNA, AND CIRCUITS MUST BE PROVED TO BE INACTIVE. CLOSE THE LIGHTNING GAP AT HE BASE OF THE MAST ENSURE MAST IS EARTHED.

GOOD CONDITION CERTIFICATES SHALL BE EXAMINED BEFORE CLIMBING THE STRUCTURE.

Reference should be made to stock lists before replacing any component of the system so as to ensure the correct replacement item is used for the particular site.

9.3 Antennas

9.3.1 Electrical Maintenance Tests

Check the electrical performance of the antenna before commencing work. A simple check with a resistance or continuity meter is not recommended, because this could give a misleading impression. A VSWR measurement is the only reliable test.

The VSWR measurement shall be taken at the building termination room so as to include the feeder.

Compare the new measurements with those taken on the last maintenance visit.

This check will indicate any change that may have taken place and the cause of the trouble must then be isolated. The most likely problems are physical damage to components or feeders, ingress of water to cables or corrosion. Occasionally problems of overheating or voltage breakdown may also occur.

9.3.2 Mechanical Inspection

(a) Inspect the antenna assembly, using binoculars as necessary, for loose or broken wires and repair or renew as required.

(b) Check the alignment and general shape of the antenna. Any defects in the supporting system will spoil the geometry of the antenna and will be visible as a lack of symmetry.

(c) After any antenna repair, perform a VSWR check and compare with previous results.

9.3.3 Replacing Lightning Arrestor

Refer to drawing 1/33711. Ensure any replacement is re-fitted in the same position as the old component.

9.3.4 Replacing Mast Lighting Isolating Transformer

Refer to drawing 1/10187, 4SL/10187 and EI-1022. Ensure that the two transformer rings are exactly square and concentric to each other. secure any adjacent antenna wires(as previously) to the secondary ring or support. arm

9.3.5 Lightning Arrestor and Ball Gap Settings

Refer to the mast G.A. drawing 1/33711 for the lightning arrestor assembly-air gap to be 9mm.

9.4 Mast

(a) Where corrosion has led to excessive deterioration of the metal, the affected items should be renewed.

CLEANING : Remove dirt by scraping then thoroughly clean the area with detergent or steam and rinse with cold water. Ensure that adjacent surfaces have not been contaminated.

DEGREASING : Remove residual oil and grease using an approved emulsion cleaner on contaminated areas only. Thoroughly clean treated area with detergent or steam and rinse with cold water. Ensure that adjacent surfaces have not been contaminated.

CHEMICAL CONTAMINATION: Wash down with fresh water all surfaces exposed to chemically polluted atmospheres before applying surface protection.

Rust patches should be washed down and treated with a rust converter. The treated areas should then be given a protective undercoat such as zinc-rich paint, followed by a top coat of micaceous iron oxide paint or its equivalent.

(b) Inspect all mast and safety rail bolts and tighten or replace as required.

(c) Check the mast earthing system for continuity and low resistance.

(d) Check all flanges and, where corrosion has occurred, clean and fit with a protective material such as resin or its equivalent.

(e) Check the obstruction lights.

(f) Check the ladder safety rail.

(g) Check the concrete foundations for signs of cracking or displacement.

(h) Remove vegetation from around the bases of all masts and stay blocks.

9.5 Guys

(a) Examine the fittings at the bottom of each stay in turn. Fittings must be free from rust and with no broken strands. Threads of rigging screws must be protected with grease and Denso tape. The rigging screws must be properly locked and all shackles correctly fitted. Split pins should be examined for damage. Any vegetation touching, or close to, the guys must be cleared away.

(b) Examine the fittings at the top of each guy, using binoculars if more practicable and remedy any damage or incipient failures as soon as possible. Particular attention should be paid to broken strands or rusted fittings, which should be treated with a rust converter and thoroughly greased to prevent further corrosion. Parafil ropes should be examined for cuts and signs of burning. Suspect ropes should be replaced

(c) Check guy tensions using a suitable dynamometer or a tension jig of the clip-on type. Re-adjust the tensions if necessary, following the normal Erection Instruction procedure.

(d) Clean insulator at base of mast.

10 Recommended Spare Parts

For an installed antenna:

Item	Part Number	Quantity
Antenna Wire - Upper	4SL/34630	1
Antenna Wire – Lower	4SL/33460 Detail 1	1
Wire Spacer	4SL/33461 Detail 1	1
Rope Parafil 2T Type A 38.1m Lg	BQ88	1
Bracket	3/4588	2
Plate Link	4/33462	1
Termination 2T PCM Type A	BQ76	2
Shackle Bow 6 x 6	BP150N	2
Shackle Dee 6 x 6	BP84	2
Line Tap	P43	5

If Antenna is to be relocated:

Item	Part Number	Quantity
Installation Spares	4SL/33374	1
Anchor Steel Work	4SL/33373	1

11 Drawings

Item	Stock List	Assembly Drawing
Antenna Support Mast, PLM Style	4SL/34539	1/33711
Antenna Support Mast, HLS Style	4SL/34825	1/33711
Antenna Curtain WB230/20PLM	4SL/34629	1/34629
Antenna Earthmat (Counterpoise)	4SL/33375	2/33710
Anchor Steelwork	4SL/33373	
Input Connector & Mounting (1 5/8" EIA)	4SL/33369	3/33369
Obstruction Lighting	4SL/10187	1/10187
Safety Rail Kit PLM	4SL/34552	3/26953
Safety Rail Kit HLS	4SL/32826	3/26953
Safety Rail (3.05m assembly)	4SL/30006	
Mast Base Earthing	4SL/6608	3/6608
Mast Section (Fabrication) PLM	4SL/28974	1/28974
Mast Section (Fabrication) HLS	4SL/3391	3391F
Insulator Top Plate (Fabrication)	4SL33450	0/33450
Antenna Wire - Upper	4SL/34630	3/34630
Antenna Wire - Lower	4SL/33460	3/33460
Spacer Wire	4SL/33461	3/33461
1 5/8" EIA Adapter to Open Wire (NSN 5820-99-680-4269)	4SL/4873	4/4873
Installation Spares	4SL/33374	
Erection Equipment	4SL/33451	
Tool Kit	4SL/33452	
Mast Headcap		2/36205
EMP & Lightning protection Equipment	4SL/34548	2/34548

12 Appendices

A	Guy Rope Tensioning Method	
B	Straining Rope Tensioning Method	
C	Antenna Electrical and RF Tests	
D	Fitting Dead End Terminations	EI-1169
E	Termination of Parafil® Rope	4PS29105
F	M.F. Antenna Maintenance	EI-1107
G	Guyed Mast Maintenance	EI-1112
H	Isolating Transformer Installation	EI-1022

Appendix A - Guy Rope Tensioning

It is recommended that each stay be tensioned by the use of a tension ratchet. Proceed as follows:

Step 1 - Having fitted a pre-formed dead end to the stay in accordance with the general procedures given in Stages 2 and 3, couple the stay to the fully extended rigging screw.

Step 2 - Attach the tension ratchet to the anchor head (1-6) by a D-shackle (1-5), and clamp the tongs to the stay above the preformed dead end. Slacken off the ratchet until the ratchet tongs can be engaged.

Step 3 - Increase the ratchet tension gradually until the correct tension is indicated on the scale.
Take up the tension by the rigging screw until the tension reading on the scale starts to decrease. This indicates that the rigging screw is about to take up the tension.

Step 4 - Gradually increase the tension of the rigging screw until the scale reading is zero. Slacken off the ratchet and uncouple from the tongs.

Step 5 - Having ascertained that the rigging screw is functioning correctly and maintaining tension, uncouple the ratchet from the anchor head and unclamp the tongs from the stay.

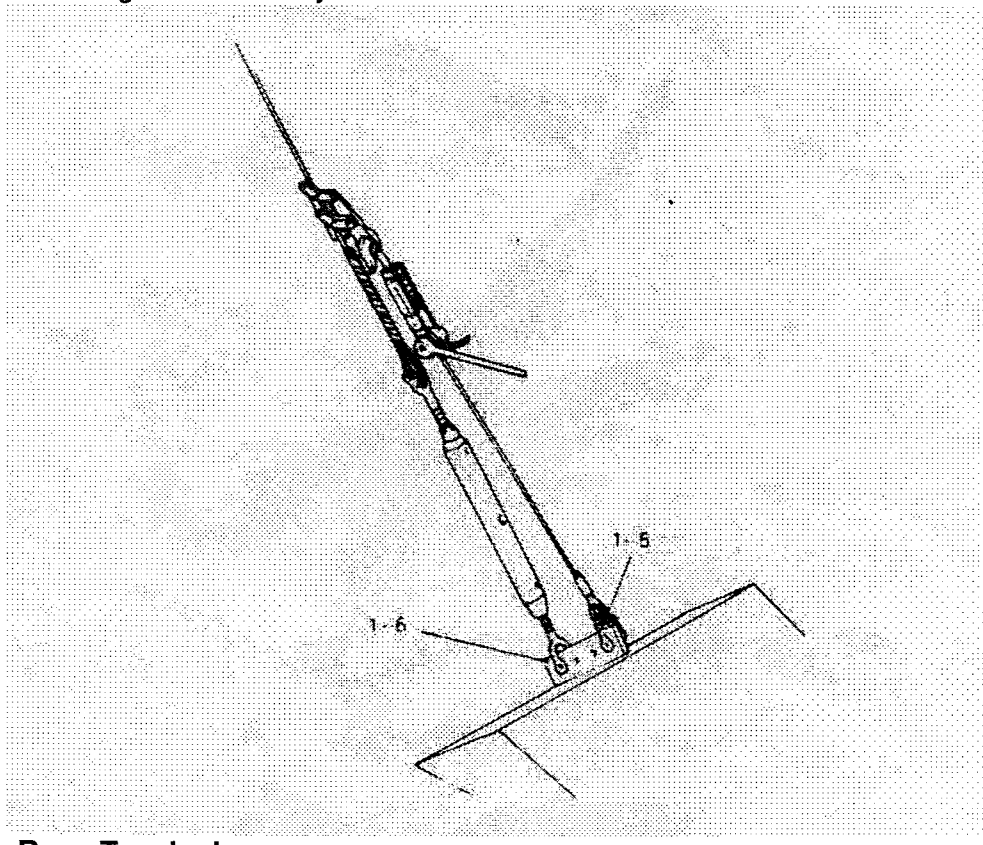


FIGURE 24 – Rope Tensioning

Appendix B - Straining Rope Tensioning

It is recommended that each straining rope is tensioned by the use of a tension ratchet. Having tensioned the straining ropes progressively so that the main antenna wires form an even cone round the mast, proceed as follows:

Step 1 - Take a length of Parafil, thimbled at the lower end, and clamp it to the straining rope above the existing termination with line clamps (1-58).

Step 2 - Attach the tension ratchet to the hairpin anchor (1-55) by a bow shackle. Slacken off the ratchet until it can be hooked into the thimble.

Step 3 - Increase the ratchet tension gradually until the correct tension reading is indicated on the scale. Take up the tension by the rigging screw until the tension reading on the scale starts to decrease. This indicates that the rigging screw is about to take up the tension.

Step 4 - Gradually increase the tension of the rigging screw until the scale reading is zero. Slacken off the ratchet and uncouple from the thimble.

Step 5 - Having ascertained that the rigging screw is functioning correctly, un-couple the ratchet from the hairpin anchor and unclamp the Parafil from the straining rope.

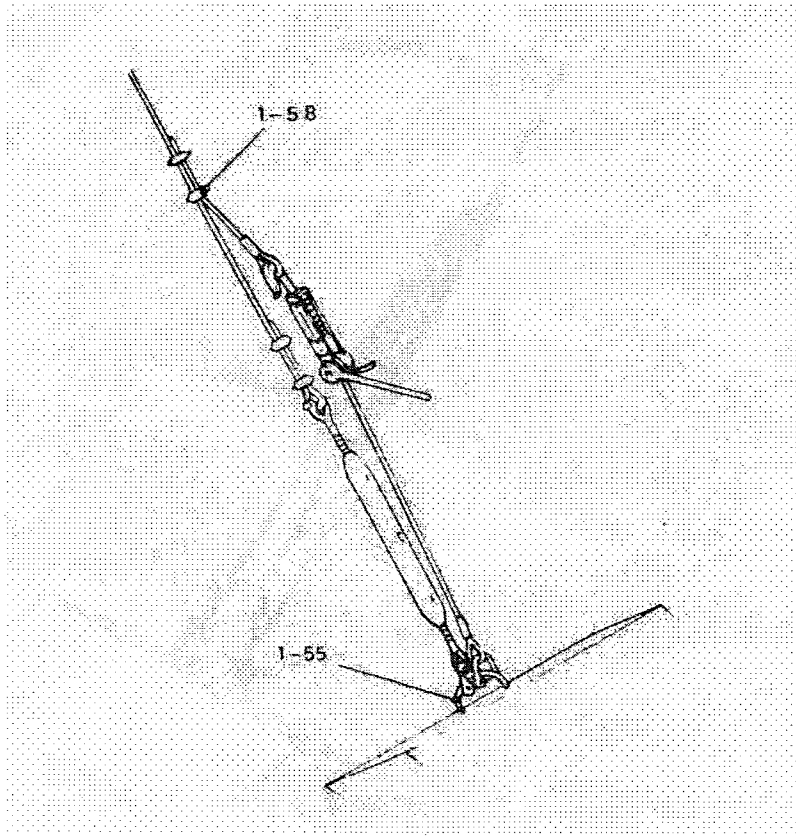


FIGURE 25 - Rope Tensioning

Appendix C - Antenna Testing Procedure

The antenna will need to be tested to ensure it performs optimally in service. The test procedures are described below.

System VSWR Tests

When the antenna is fully erected and has been inspected for mechanical integrity and correct assembly, the antenna system should be test forVSWR.

Using a Network Analyser or similar;

1. Connect a cable to the reflection port of the analyser;
2. Ensure that the analyser channel being used is measuring reflection (usually A/R)
3. Set up the frequency range to start from 2 MHz to 30 MHz;
4. Using known standards, calibrate the system in the usual way;
5. Connect the calibrated analyser to the input of the antenna;
6. Check that the VSWR is < 2:1.

Appendix D - Fitting Dead End Terminations

EI-1169

CSAWireless
A TriPoint Global Company

Fitting Instructions for Wire Rope

(Dead End) Termination

Introduction

Wire rope dead-ends are intended to be used for on-site termination of steel wire rope.

Various types are available to suit different wire rope construction and wire rope applications.

Dead-ends supplied as part of a CSA Limited mast/antenna system will be the correct types suitable for the application.

Where different sizes of ropes and dead-ends are supplied, identify from the supply list and installation drawing which fitting is used with its correct rope. The identification tag on the dead-end should correspond with its entry in the supply list.

Characteristics

Cross-over marks to indicate starting point for applications.

Pitch Length

One complete wrap.

Short Leg - Long Leg

Visual aid for identifying wires belonging to each leg of completely applied fitting.

Identification Tag

Shows reference number and rope diameter range.

Material Used

Dead-ends are made of material compatible with the rope to which they are applied.

Lay Direction

Must be the same as that of the outer stranding to which it is applied.

Application

Referring to the figures below, these indicate the method of application.

Fit the relevant reaving thimble into the loop of the dead-end and offer the assembly up to the rope at the pre-determined location - see the mast installation Erection Instructions.

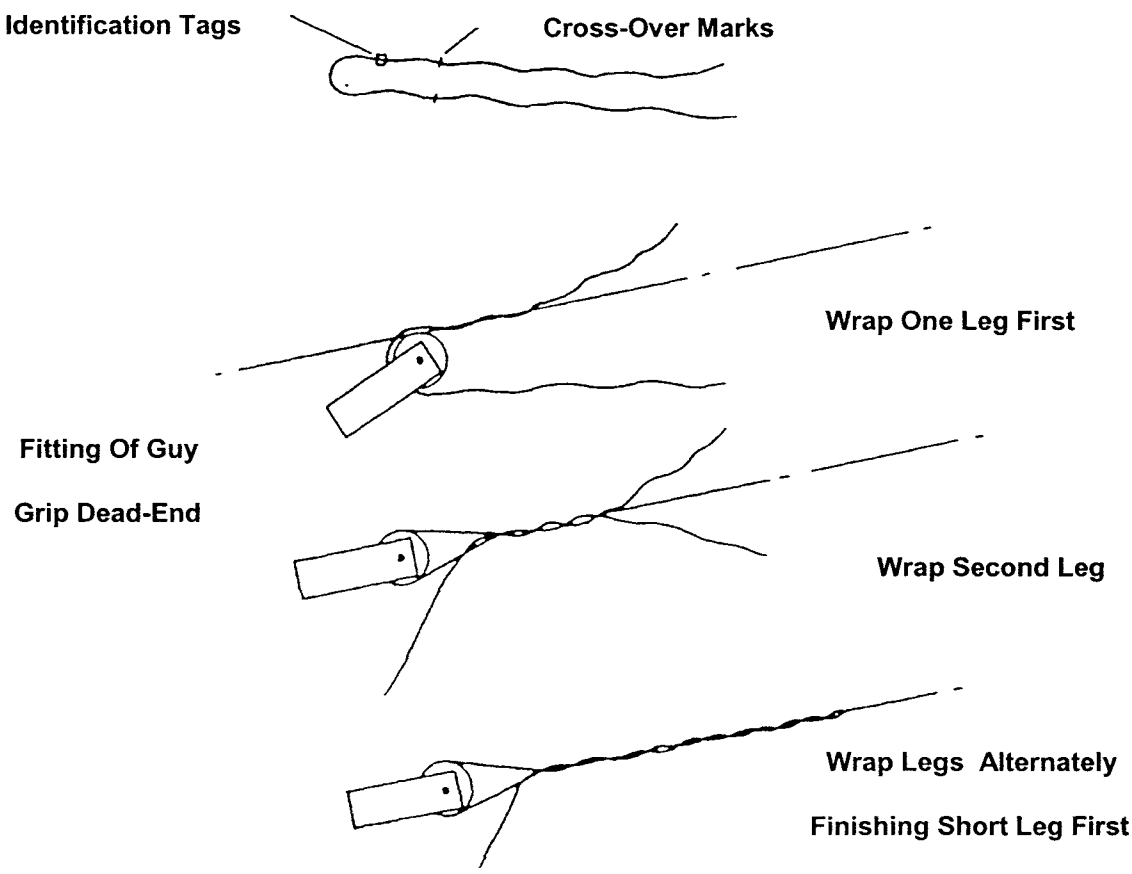
Start to wrap the dead-end around the rope at the cross-over marks. Wrap one leg 2 or 3 turns, then wrap the second leg, ensuring each leg sits snugly in the spiral.

Continue wrapping each leg alternately and finish on the short leg first.

The application is now complete.

CAUTION

DO NOT RE-USE DEAD-ENDS AFTER THE ORIGINAL INSTALLATION.



Schematic Of Dead-End Application

COMSAT RSI - CSA ANTENNA SYSTEMS

KNIGHT ROAD, ROCHESTER, KRNY MR2 2AX ENGLAND

Telephone: (01634) 715544 Facsimile (01634) 714752

Appendix E - Termination of Parafil® Rope

4PS29105

ORIGINAL FRAME SIZE 190×277

DO NOT SCALE IF IN DOUBT, ASK THIRD ANGLE PROJECTION

PARAFIL ropes derive their unique properties from their essentially parallel fibre structure (see Technical Note 1), and to utilise these properties to maximum advantage end connectors (terminals) based on a conical wedge principle have been developed and patented.

Typical standard designs are shown in Figs 1 and 2.

1 MATERIALS

Standard end connectors are made from anodised aluminium alloy (HE30TF, AA6351, anodised to BS1615, AA25) or galvanised mild steel (EN1A/220M07, galvanised to BS 970). End connectors are also made from other materials on request, eg. stainless steel (EN58J/316S16), to suit particular requirements.

Selection of the end connector material will depend on the environment in which it is to be used and care should be exercised. For example aluminium fittings should not be used in direct contact with copper or copper alloys since in continuously wet conditions problems associated with electrolytic corrosion will occur.

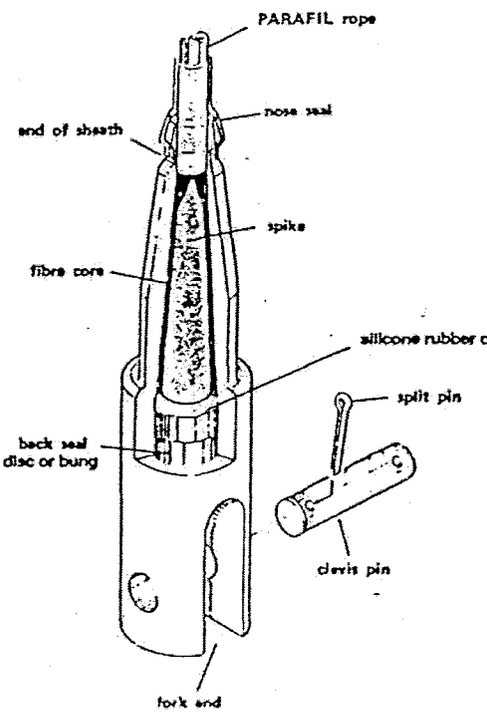


Fig. 1 One Piece Terminal (fork end only)

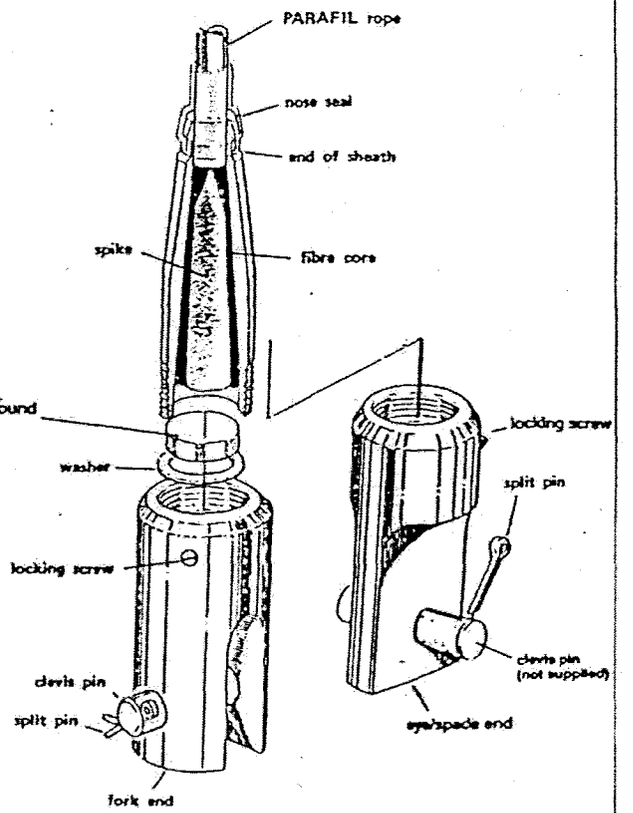


Fig. 2 Two Piece Terminal (choice of fork or eye/spade ends)

SCALE 0

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE SPECIFIED	MATERIAL	FINISH

CSA

CSA Limited
Knight Road, Rochester, Kent ME2 2AA, England
Telephone (0634) 715544
International + 44 634 715544
Fax (0634) 717242 Telex 96144 CSAG

TITLE PROCESS SPECIFICATION FOR THE TERMINATION OF 'PARAFIL' ROPE

DRAWN	CH'KD	REFERENCE	SCALE
J GAUL			
APP'D	DATE	4/PS 29105	ISSUE
	27-1-93		1

ISSUE 1 27/1/93

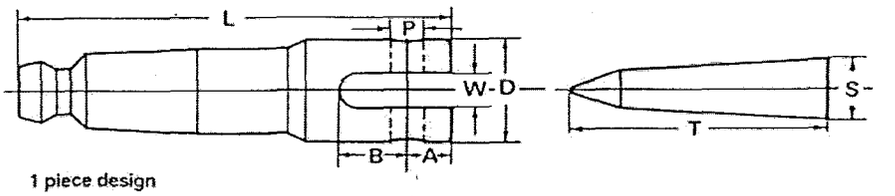
(A SHEETS A4)

2 TYPICAL DIMENSIONS

The dimensions of standard aluminium alloy and galvanised or electro-plated mild steel terminals are given in the following tables.

Figures quoted are approximations.

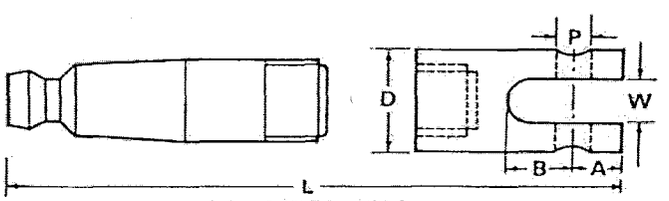
(i) Type A Ropes (polyester fibre core)—1 piece design (see fig. 1 above).



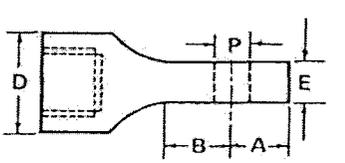
1 piece design

Size	Terminal Dimensions						Spike Dimensions		Approx. Assembly Weight Including Seals, etc.	
Tonnes	L mm.	D (Dia) mm.	P (Dia) mm.	W mm.	A mm.	B mm.	T mm.	S (Dia) mm.	Aluminium Alloy (kg.)	Mild Steel (kg.)
0.5	79	17	6.4	7	8	13	30	10	0.04	0.11
1	98	22	8.0	8	10	16	40	12	0.10	0.17
2	123	30	9.6	10	12	19	52	16	0.15	0.34
3.5	156	38	12.7	17	16	25	68	19	0.33	0.63
5.0	188	44	16.0	20	20	32	82	24	0.48	1.13
7.5	224	54	19.1	23	24	39	100	28	0.79	1.45
10	254	60	22.3	26	29	44	114	31	1.16	1.87
15	305	76	25.4	33	32	51	140	38	2.10	2.75
20	340	86	28.6	36	36	56	160	43	2.95	5.22
30	416	102	38.1	42	48	76	189	50	5.40	12.80

(ii) Type F & G Ropes (aramid fibre cores)—2 piece design (see fig. 2 above) except*.



(when joined together)



Dimensions of eye/spade connector on request.

Size	Terminal Dimensions						Spike Dimensions		Approx. Assembly Weight Including seals etc.	
Tonnes	L mm.	D (Dia) mm.	P (Dia) mm.	W mm.	A mm.	B mm.	T mm.	S (Dia) mm.	Aluminium Alloy (kg.)	Mild Steel (kg.)
0.5	67	14.2	5	4.8	6.5	13	19	5.3	0.02	N.A.
0.75	74	14.2	5	4.8	6.5	13	23.5	6.7	0.03	N.A.
* 1.5	92	25	8	8.5	10	16	33	10	0.09	0.23
* 3	132	38	12.8	17	16	25	49	13	0.25	0.57
6	168	44	16	20	20	32	72	17	0.45	1.10
10.5	225	60	22.4	26	29	44.5	98	22	1.00	2.40
15	257	76	25.5	33	32	51	115	28	1.60	4.00
22.5	305	83	28.7	36	36	56	144	33	2.40	6.10
30	371	102	38	42	48	76	170	37	4.90	12.25

* 1 piece design only N.A.—not available.

Dimensions of terminations for PARAFIL ropes of larger tonnages will be supplied on request.
The company reserves the right to amend the specifications and dimensions as necessary.

3 WATERPROOFING TECHNIQUES

Although the presence of water inside PARAFIL ropes has no effect on the strength characteristics, water will affect the electrical properties (Technical Note 2), thus all industrial terminals are fitted with nose and back seals (Figs 1 and 2).

In areas of high electrical stress individual end users have taken extra precautions, for example by filling the space between the end of the rope and the back seal with a flexible silicone compound (eg. Loctite Superflex, RTV Silicone Compound, or Wacker Elastosil E43), and overwrapping the silicone nose seal with self amalgamating tape (eg. Elkosil-Band E12 or Rotunda PIB Tape 2501).

4 ASSEMBLY INSTRUCTIONS

Fitting end connectors to PARAFIL ropes is a quick and easy operation. The following notes are for the guidance of those unfamiliar with PARAFIL terminations.

(1) Slide the silicone rubber front seal over the end of the PARAFIL rope to a distance from the end about 70 or 80mm greater than the length of the body of the terminal plus the length of the spike, and fold back about ⅓ of its length. French chalk or talc on the rope will aid this operation, but any surplus should be removed from the rope and inside the body of the terminal. OILS OR GREASES SHOULD NOT BE USED.

(2) Slide the body of the terminal over the rope.

(3) Make a single circumferential cut in the rope sheath at a point from the end of the rope equivalent to the length of the spike. Care must be taken to avoid cutting the core fibres. This is best achieved by cutting say, eg. only 90% through the sheath and bending the rope at the cut to sever the remaining part of the sheath.

(4) Pull off the cut portion of sheath.

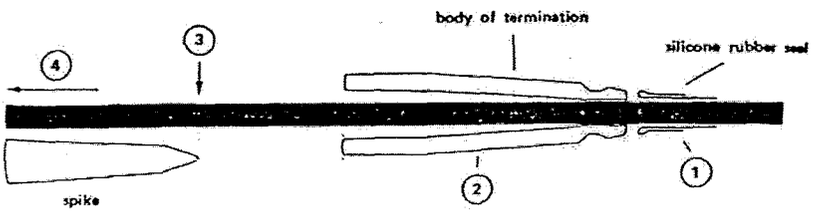
(5) a) Hold the fitting vertically and allow the fibres to fall back over the end of the rope and terminal. Pull the rope down until the cut end of the sheath is level with the back end of the terminal and arrange the fibres so that they are straight (ie. not crossed over each other) and are evenly distributed.

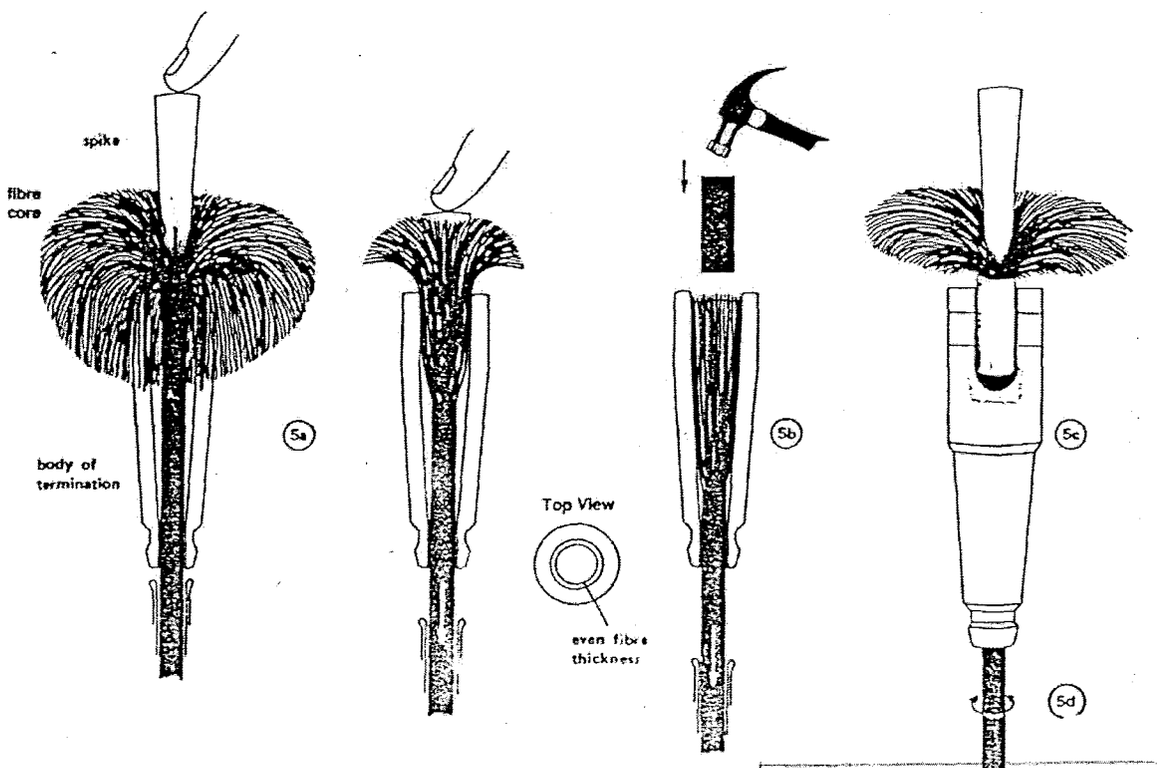
Rest the tip of the spike in the centre of the end of the rope. Keeping a light finger pressure on the spike, pull down on the rope drawing both the spike and fibres into the body of the terminal. This should result in an even anulus of fibre trapped between the body of the terminal and the spike.

b) Tap the spike gently but firmly home whilst pulling down on the rope. Generally a change in the sound of the hammer striking the bar is evident when the spike is firmly home.

c) For one piece terminals (see Fig 1) it is often found that inserting a stiff paper cylinder into the lugs of the terminal aids assembly. Remove the paper cylinder after assembly.

d) Check that outer sheath is not trapped with spike by rotating rope through ± 30°.





A.P.S 29105 SHT.3 ISS.1.

(6) Slide the silicone rubber seal up to the nose of the terminal, and unfold it over the end of the terminal.

(7) Complete the assembly by fitting back seals (and waterproofing where appropriate).

a) For two-piece terminals simply screw the two parts together, and tighten the locking screw. If further waterproofing is required fill the gap between the end of the spike and the back end of the body of the terminal with a silicone rubber compound.

b) For one-piece terminals push the back seal squarely into the locating groove using a piece of tube or rod. (Waterproof with silicone rubber compound where required).

c) Further waterproofing can be achieved at the nose of the terminals by overwrapping with a self amalgamating tape.

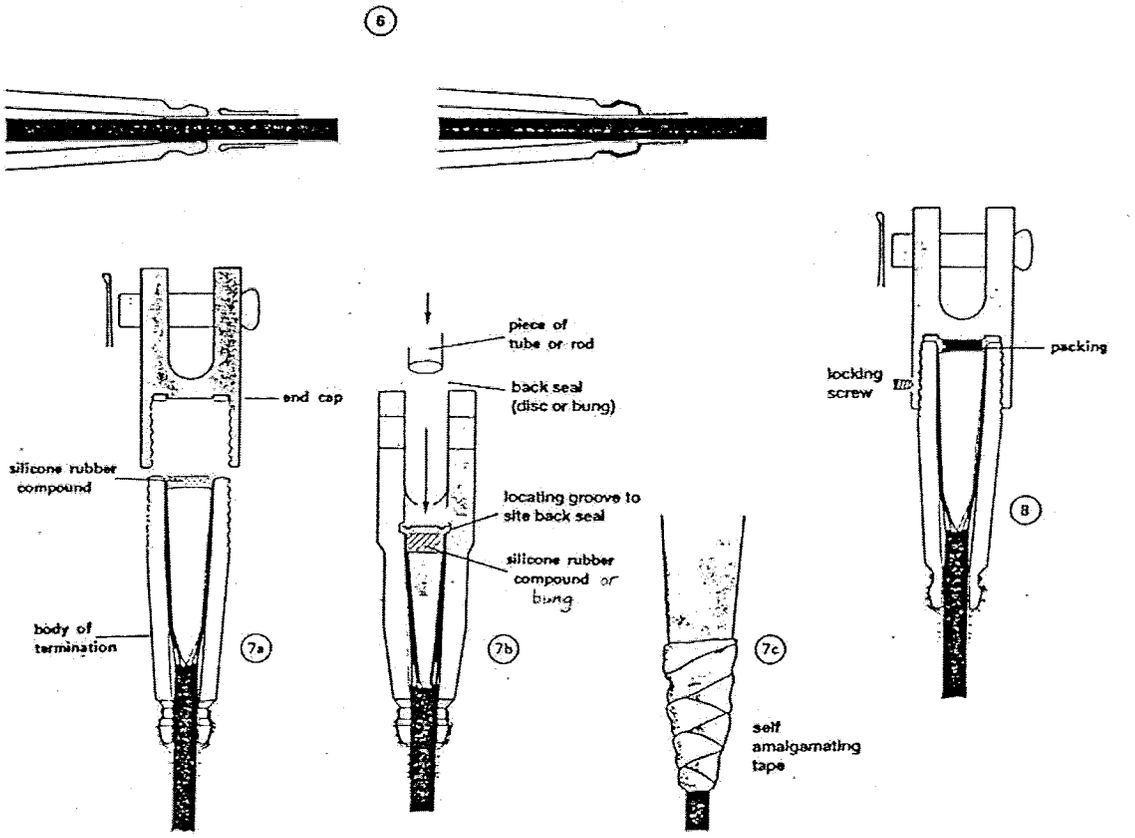
IMPORTANT NOTES

Tapping the spike home (see operation 5b) during the assembly procedure will secure the spike for most purposes, eg. transportation. When tension is applied to a terminated PARAFIL rope the spike is drawn further into the terminal so that it cannot be removed without cutting the rope at the nose of the fitting and pressing the spike out.

Thus for rope always in tension the assembly procedure described has proven to be totally adequate.

However, when PARAFIL ropes are used in situations where the rope is installed without tension and can then be subject to vibration or very low oscillating loads before high tensions are applied (eg. as could happen in certain types of moorings) then it is recommended that the ropes should be pretensioned at the terminal before use to 10 or 20% of the breaking load or preferably to the maximum working load.

If under certain circumstances tensioning is not possible, then some end users have successfully used packing between the back of the spike and the end cap (2 piece fittings only) to ensure no spike movement (see 8).



Linear Composites

Vale Mills Oakworth Keighley
West Yorkshire BD22 0EB

Telephone 0535 643363
Fax 0535 643605
Telex 517288 VALHIL G.

MARCH 1988

APS 29/05

Appendix F - M.F. Antenna Maintenance

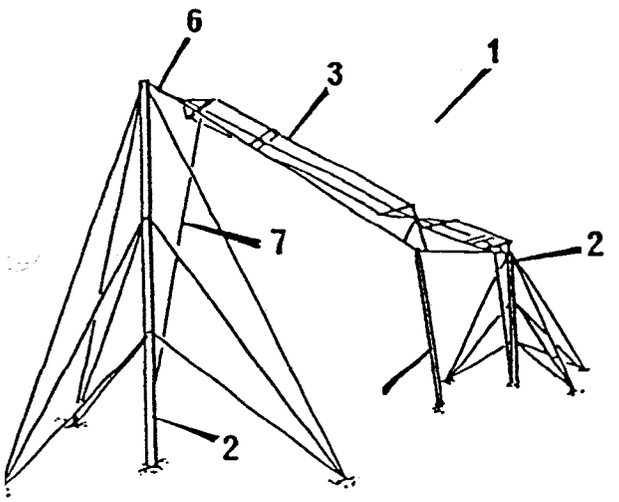
EI-1107

COMSAT RSI
CSA Antenna Systems

Maintenance of Antenna Installations

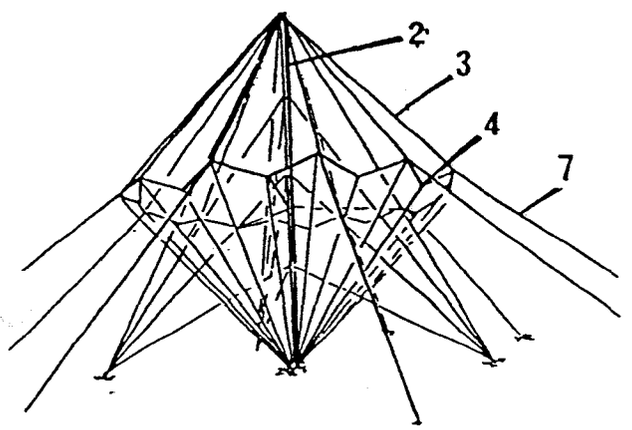
LF, MF and HF antennas

EI-1107-1



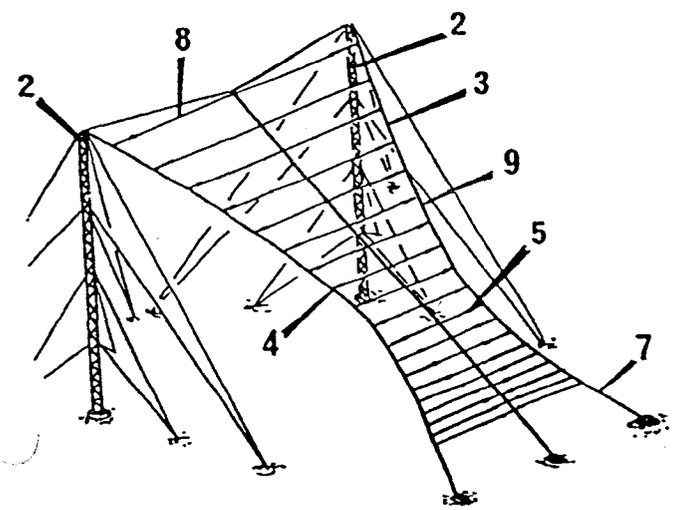
All antenna installations should be inspected at intervals not exceeding one year so that any incipient failures may be found and rectified. Any defects found should be rectified at the time if spares are available.

DANGER. BEFORE CLIMBING, OR WORKING ON ANY STRUCTURE OR EQUIPMENT CONSULT THE ENGINEER IN CHARGE. HE MUST ISOLATE AND GROUND ALL CIRCUITS WHICH CAN CAUSE DANGER.



Step 1. Check the electrical performance of antenna before commencing work. A simple check with a resistance or continuity meter is not recommended, these could give a misleading impression. A VSWR measurement is the only reliable test.
Compare new measurements with those taken on last maintenance visit.
This check will indicate any change which may have taken place the cause of the trouble must then be isolated. The most likely problems are physical damage to components or feeders, ingress of water or corrosion. Occasionally problems of overheating or voltage breakdown might also occur.

Step 2. Check the supporting structures in accordance with the appropriate instruction.



Step 3. Visually inspect the antenna - and those parts of the earth system above the ground - for loose or broken wires. Replace as necessary. With many antennas it will be necessary to lower the array to be able to carry out this inspection thoroughly.

Step 4 Examine all joints for corrosion and tightness of screw fixings. Corroded joints should be dismantled and the affected parts thoroughly cleaned, smeared lightly with silicone grease and reassembled.

Step 5. Clean all insulators and examine for cracks or chips. Replace as necessary.

Step 6. Ensure all pulley blocks are running freely . Lubricate as necessary.

Step 7 Examine all ropes—halyards and standing lines - for signs of fretting or fraying. Remove the cause of any damage as well as replacing the damaged rope. Parafil ropes should be examined with special care as damage may not be obvious. No cuts or major damage of the black sheath should be tolerated. There should be no sign that the rope has moved in the terminations.

Step 8 Pay particular attention to the condition of jumper leads and terminal lugs at the feed point of the antenna and of the individual radiating elements. Clean any corroded parts and replace, if necessary, any damaged leads or terminations.

Step 9 Re-rig the antenna; check the tension in wires and supporting catenaries of the array, adjust until the antenna is hanging correctly. Check the locking of all adjustable clamps and rigging screws. Rigging screws should be greased and wrapped in waterproof tape.

Step 10 Examine and reset the lightning arrestor gap in antenna feeder system.

Step 11 Inspect all open wire feeder runs and check the tension of all wires and pole stays. Look for broken wire strands or cracked insulators. Treat rust on any poles or fittings. Ensure that all rigging screws are locked and their thread protected with grease and or waterproof tape.

Step 12 Return antenna to service after rechecking electrical performance.

COMSAT RSI - CSA ANTENNA SYSTEMS
KNIGHT ROAD, ROCHESTER, KENT ME2 2AX ENGLAND
Telephone: (01634) 715544 Facsimile (01634) 714572

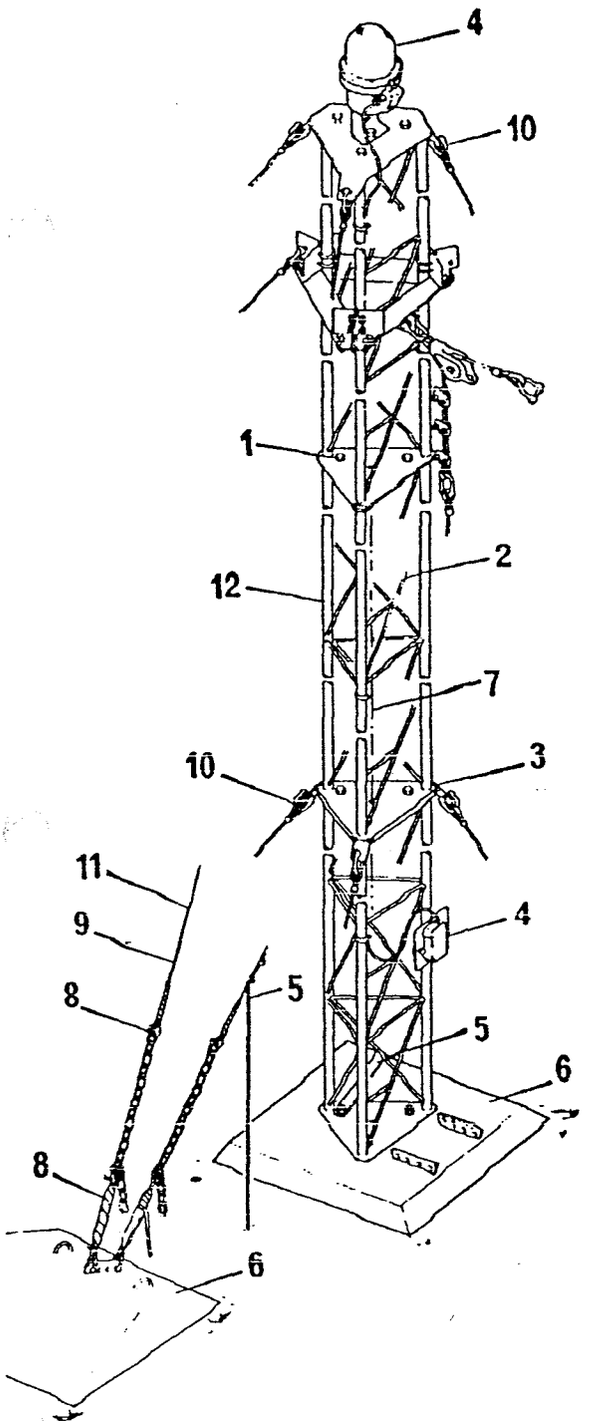
Appendix G - Guyed Mast Maintenance

EI-1112

COMSAT RSI
CSA Antenna Systems

Maintenance of Antenna Installations
Guyed Lattice Masts

EI-1112-1



All antenna installations should be inspected at intervals not exceeding one year so that any incipient failures may be found and rectified. Any defects found should be rectified at the time if spares are available.

DANGER. BEFORE CLIMBING, OR WORKING ON ANY STRUCTURE OR EQUIPMENT CONSULT THE ENGINEER IN CHARGE. HE MUST ISOLATE AND GROUND ALL CIRCUITS WHICH CAN CAUSE DANGER.

Step 1 Systematically check the tightness of all nuts, bolts and other fittings retightening any which are found loose.

Step 2 Note any mast members which have been bent . These should be reported to the inspection authority .

Step 3 Check the structures for any localised areas of rust, wire brush the affected area before painting with zinc rich paint, followed by one coat of micaceous iron oxide.

Step 4 Examine the obstruction lighting, checking that the lamps are operating, refractors are firmly in place and cover glasses are clean and unbroken. The cable supplying power to the lamps should be checked for damage by abrasion or impact Check junction boxes and entry glands for damage.

Step 5 Examine mast earthing connections. The connections are generally joints between different metals and are prone to corrosion. The original coating of bitumastic paint or protective tape must be intact; any imperfections must be remedied.

Note. If the earth connections or the point of attachment to the structure are heavily corroded, remedial action should be carried out but the situation must be reported to the inspection authority.

Step 6 Inspect the foundations for cracks. Check the general area of the mast base for signs of earth movement. Report any findings to the inspection authority.

Step 7 Check the verticality of the mast using a theodolite.

Step 8 Examine the fittings at the bottom of each stay in turn. Fittings must be free from rust with threads of rigging screws protected with grease and waterproof tape Ensure that rigging screws are properly locked and that all shackles and link plates are correctly fitted. Any splitpins should be examined for damage. Clear away any vegetation touching or close to stays.

Step 9 Examine each stay in turn. Check steel stays for rust or broken strands and parafil stays for damage by animals or birds. Use binoculars if necessary. Any damaged stays must be reported.

Step 10 Examine the fittings at the top of each stay. As in 8 above.

Step 11 Check the stay tensions using suitable dynamometer or a tension gauge of the ,clip on, type. Stays should be adjusted to the design tension for the mast concerned whilst maintaining verticality.

Note. If the installation is a Mast Radiator check mast as above and refer to HF antenna maintenance list for radiator check.

Step 12 Painting

After some years in a marine or other highly corrosive environment the zinc coating on the mast may become thin and corrosion set in, especially around the connection points. In these cases the mast should be painted. A common treatment requires the mast to be wire brushed, degreased and then painted with one coat of 80/20 zinc rich primer followed by two coats of micaceous iron oxide paint. This treatment is not generally required on new structures and should not be applied to newly galvanised surfaces—special pre-treatment is required.

If the structure has previously been painted, clean down and touch up all areas of corrosion or flaking paint using new paint, if possible to the original specification.

COMSAT RSI - CSA ANTENNA SYSTEMS
KNIGHT ROAD, ROCHESTER, KENT ME2 2AX ENGLAND
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Appendix H - Isolating Transformer Installation

EI-1022

COMSAT RSI
CSA Antenna Systems

DATE : March 1995 EI-1022-B
REVISION : B

ERECTION INSTRUCTION

FOR

ISOLATION TRANSFORMERS RACAL-DECCA TYPE.

COMSAT RSI
CSA Antenna Systems Division

Knight Road, Rochester, Kent. ME2 2AX, England.
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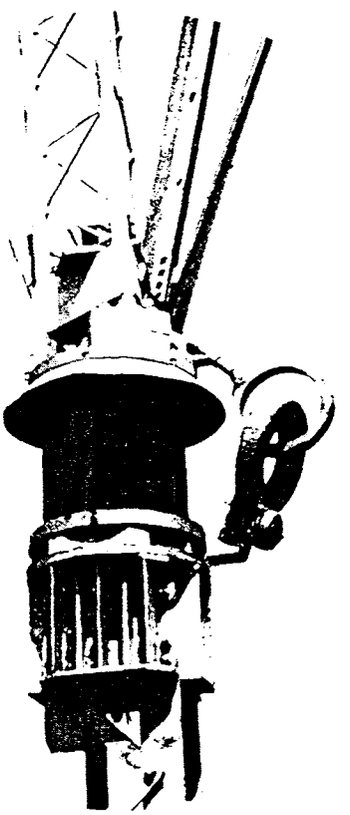
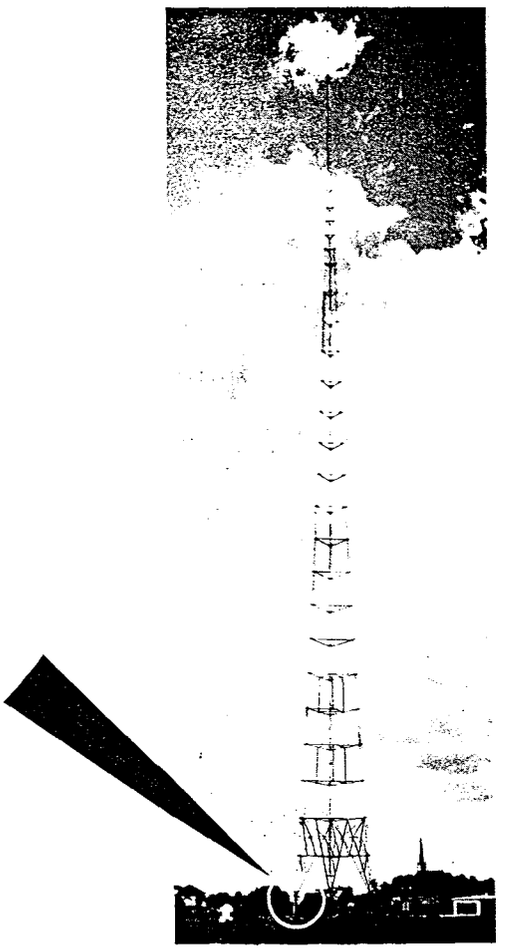
Racal-Decca Canada Ltd.

AUSTIN RING TYPE ISOLATION TRANSFORMERS
for
RADIO TOWER AND MAST LIGHTING

DUAL WINDING SERIES



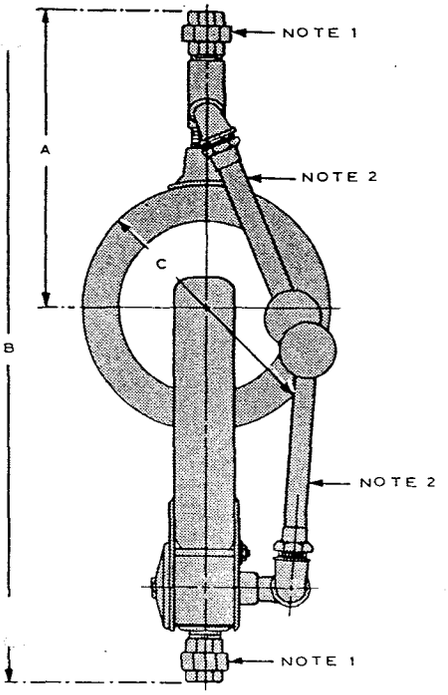


- **AIR INSULATION** – Minimum R.F. loss
- **LOW CAPACITANCE** – Minimum and stable effect on tuning.
- **REGULATION** – Better than 10% under normal load conditions.
- **EFFICIENCY** – Better than 90% under normal load conditions.
- **MOUNTING** – Standard Pipe Unions supplied.
- **LIGHTNING GAP** – Supplied.

SPECIFICATIONS FOR STANDARD TYPES SHOWN OVERLEAF.
OTHER VOLTAGES AND POWER RATINGS AVAILABLE ON REQUEST.

RACAL

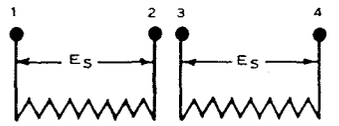
AUSTIN LIGHTING TRANSFORMERS

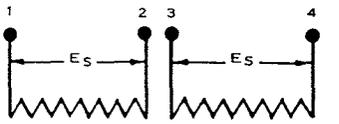


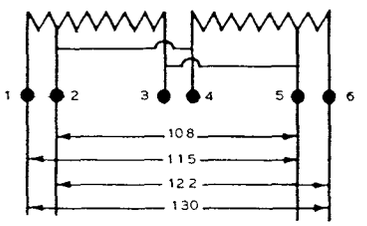
SECONDARY VOLTAGE E_S

115 for D1 type

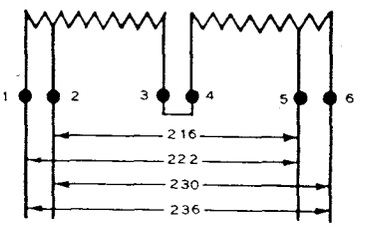
230 for D2 type







PRIMARY CONNECTIONS FOR
115 NOMINAL LINE VOLTAGE.



PRIMARY CONNECTIONS FOR
230 NOMINAL LINE VOLTAGE.

REFER TO INSTRUCTIONS SUPPLIED WITH TRANSFORMER FOR INSTALLATION AND CONNECTION DETAILS.

DIMENSIONS

RATING KVA	A	B	C	PIPE FITTINGS
0.7 & 1.7	15" 381mm	33-3/4" 857mm	12-1/2" 318mm	1" NPT
3.5	18-3/4" 476mm	43" 1092mm	16" 406mm	1-1/2" NPT
5.0	24-1/2" 622mm	61" 1549mm	25" 635mm	1-1/2" NPT

NOTE 1: PIPE UNIONS PERMIT ATTACHMENT OF SUPPORTS FOR PRIMARY AND SECONDARY RINGS.

NOTE 2: IF OTHER THAN VERTICAL MOUNTING USED, RODS FOR LIGHTNING GAP WILL HAVE TO BE SHORTENED TO SUIT.

TRANSFORMER TYPE	CAPACITY KVA	SECONDARY VOLTAGE	NET WEIGHT	
			POUNDS	KILOGRAMS
A-07D1	0.7	115/230	70	32
A-07D2	0.7	230/460	70	32
A-17D1	1.7	115/230	90	41
A-17D2	1.7	230/460	90	41
A-35D1	3.5	115/230	190	86
A-35D2	3.5	230/460	190	86
A-50D1	5.0	115/230	370	168
A-50D2	5.0	230/460	370	168

RACAL-DECCA CANADA LTD.
Insulators Division
71 Selby Road, Brampton, Ontario L6W 1K5, Canada
Telepnone: (416) 457-8720 Telex: 06-97699 Fax: (416) 457-2193

AUSTIN LIGHTING TRANSFORMERS
(DUAL WINDING SERIES)

PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLING A LIGHTING TRANSFORMER, WHETHER ON A NEW INSTALLATION OR AS A REPLACEMENT UNIT

TRANSFORMER TYPE	CAPACITY KVA	NOMINAL SECONDARY VOLTAGE	R.F. FLASHOVER DRY - SEA LEVEL
A-07D1	0.7	115/230	65 KV Peak
A-07D2	0.7	230/460	65 KV Peak
A-17D1	1.7	115/230	65 KV Peak
A-17D2	1.7	230/460	65 KV Peak
A-35D1	3.5	115/230	85 KV Peak
A-35D2	3.5	230/460	85 KV Peak
A-50D1	5.0	115/230	100 KV Peak
A-50D2	5.0	230/460	100 KV Peak

The transformers listed above are intended for use on radio masts and towers with moderate R.F. potentials across the base insulator. When installed in the open the permissible R.F. potential between primary and secondary rings will be considerably less than the dry flashover figures given above. For operation under wet, dusty or insect infested conditions the maximum permissible voltage will depend on the amount of rain, etc., the frequency of occurrence and the acceptability of occasional arc overs and level of drip corona. Under heavy rain conditions excessive drip corona will probably occur before arc over. It is unlikely that satisfactory operation in an exposed location will be achieved above the following levels of R.F. voltage:

A-07D1, A-07D2, A-17D1 and A-17D2	-	22 KV Peak
A-35D1 and A-35D2	-	34 KV Peak
A-50D1 and A-50D2	-	52 KV Peak

CAUTION

1. Ensure that the tower or mast is grounded.
2. Check that the mast lighting circuit is not faulty.
3. Ensure that the primary power wires are not "live".
4. Ensure that the primary protective circuit is in accordance with the recommendations made below.

Primary Protective Circuit

A circuit breaker is not recommended unless it has been chosen to have the required delayed action to withstand the inrush current to cold lamp filaments. A fuse will provide ideal protection and has an inherent thermal delay which will take care of the inrush current at the time of switching on.

Whether a fuse or circuit breaker is chosen, its operating current should be approximately 20 per cent above the normal operating current for the lamp load in use.

Transformers are sometimes damaged because of insufficient care in choosing the primary protective circuit. Though there is appreciable flux leakage resulting from the open nature of the primary and secondary windings, the efficiency and regulation of the transformer is such that windings are in danger of being over-heated and damaged if the full load rating is exceeded by more than a few percent for any appreciable length of time. Safe operation is assured if the primary current is measured under normal load conditions and a fuse chosen with a rating approximately 20 percent above this operating current.

Installation - Mounting

WARNING: DO NOT ATTEMPT TO TURN OR ADJUST ANY PIPE FITTINGS BELOW THE UNION ON THE SECONDARY OF THE TRANSFORMER. ANY MOVEMENT OF THE FITTINGS BELOW THE UNION WILL BREAK THE WATERPROOF SEAL AND WATER WILL ENTER AND SHORT THE SECONDARY. ANY ADJUSTMENT NECESSARY MUST BE MADE USING THE SECONDARY UNION.

The A-07D1 to A-35D2 range of transformers are shipped in triwall cartons, while the A-50D1 and A-50D2 are shipped in wooden crates. When removing the transformer from its crate or carton, do not attempt to lift it out with the secondary coil as damage to the copper secondary shield may occur. Both the primary and secondary coils should be supported.

Mount the primary and secondary rings by screwing the unions onto suitable support pipes arranged so that when the unions are tightened the rings are centred one within the other. The following sizes of pipe unions are used:

A-07D1, A-07D2, A-17D1, A-17D2	- 1" N.P.T.
A-35D1, A-35D2, A-50D1, A-50D2	- 1½" N.P.T.

Install the lightning gap as shown in attached drawing AG-078, ensuring that the arm attached to the secondary ring has the sphere with a drain hole. The gap is adjusted by movement of the primary

arm through rotation of the street elbow supports which should be screwed firmly enough into place to prevent accidental movement in the arm but not so tightly that further movement cannot be made if required for gap adjustment. A very approximate indication of the variation of flashover voltage with gap setting is given below:

GAP SETTING	GAP-DRY FLASHOVER KV PEAK AT 100 KC	GAP-WET FLASHOVER KV PEAK AT 100 KC
½"	38	18
1"	68	29
1½"	88	38

Installation - Bonding (Reference Drawing AG-078)

Two bonding braids are provided on the primary assembly and two on the secondary assembly. The primary bonding leads, one of which is attached to the Lightning Gap Arm and the other to the Transformer mounting clamp and core, should be connected with a good mechanical and electrical bond to the antenna ground system. The secondary bonding braids, one of which is connected to the Lightning Gap Arm and the other to the secondary shield, should be mechanically and electrically securely connected to the tower or mast. Bonding connections should be made as short and direct as possible after allowing any necessary slack for mounting adjustments. Any surplus length of braid should be cut off.

Installation Wiring

It is necessary to ensure that no substantial radio frequency potential exists between the secondary winding and its outer shield or between the primary winding and its core. If the mast lighting circuit is run continuously in metal conduit well bonded to the mast, this will generally be satisfactory. If the primary power is brought to the transformer from the transmitter building in conduit or metallic covered cable which is bonded to the antenna ground system, this should be adequate protection against stray RF pick up.

If the above conditions are not met then it is desirable at the transformer primary and/secondary connections to provide RF by-passing by installing good quality mica capacitors of 0.01 uf minimum from each line to ground. These capacitors should have a minimum DC working voltage rating of 600 v for 115/230 volt circuits and 1200 v for 460 v circuits.

Installation - Secondary Connections (Reference Drawing AG-111)

Two identical secondary windings are provided on each transformer. These can be connected in series or in parallel, or used as individual windings. Each of the two secondary windings is designed to carry half the rated KVA output of the transformer.

On transformers Type D1, a parallel connection provides 115 volts and a series connection 230 volts. On a Type D2 transformer, a parallel connection provides 230 volts and a series connection 460 volts.

Secondaries may be connected in parallel by joining wires Nos.BK 1 & Y to one line and wires Nos.R2 & G4 to the other line. Secondaries may be connected in series by joining wires Nos.R2 & Y3 and connecting the line to wires Nos. BK1 & G4.

With a series connection of the secondaries, the connection of wires Nos. 2 & 3 may be used as a centre tap or neutral line if required by the mast lighting system.

All secondary connections should be well insulated with approved connectors or electrical tape.

Installation - Primary Connections (Reference Drawing AG-112)

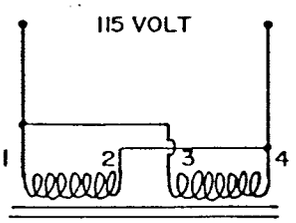
Two primary windings are provided on each transformer. As with the secondaries, these windings can be connected in series or in parallel but due to the arrangement of voltage-adjusting taps, care must be exercised in making the parallel connection. On each transformer the section of the primary windings connected to wires Nos. R2 & Y3 and Nos. G4&B5 are balanced, and it is these portions of the primary windings that can be connected in parallel. This is clearly shown on Drawing AG-112. Portions of the primary windings between wires Nos. BK1 & R2 and B 5 & W 6 are not identical and are deliberately unbalanced to give greater flexibility when voltage adjustments are required. Both D1 and D2 types of transformers have similar primary windings which, when connected in parallel, can be connected to a nominal 115 volt power source, and when connected in series to a nominal 230 volt circuit.

Taps have been provided on the primaries to permit a range of voltage adjustments when connected for either 115 or 230 volt operation. As an example, assuming the primaries have been connected in series and the line voltage was 230 V, the two line wires would be connected to wires Nos. R2 & W6.If this did not give the desired secondary voltage, a lower secondary voltage can be obtained by connecting the lines to wires Nos.BK1 &W6,or higher voltages obtained by connecting the line to wires Nos.BK1 & B5,or Nos. R2 & B5. A similar voltage adjusting arrange ment is available when primaries are connected in parallel

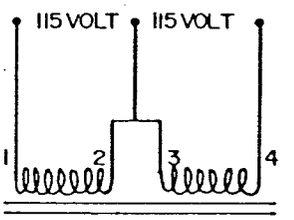
All unused wires and all connections should be well insulated with approved connectors or electrical tape.

AUSTIN LIGHTING TRANSFORMERS

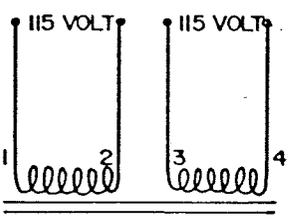
ONDARY LOAD CONNECTIONS. FOR TYPES: A-07DI
A-17DI
A-35DI
A-50DI



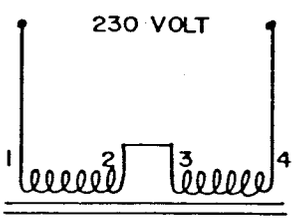
5 VOLT TWO(2) WIRE



115/0/115 VOLT THREE (3) WIRE



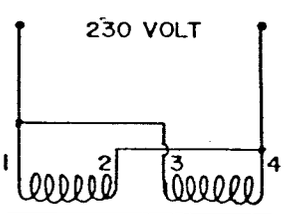
DUAL 115VOLT TWO (2) WIRE



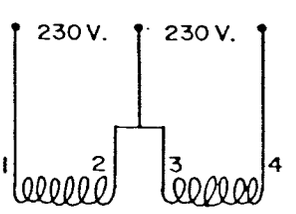
230 VOLT TWO(2) WIRE

CONDARY LOAD CONNECTIONS FOR TYPES: A-07D2
A-17D2
A-35D2
A-50D2

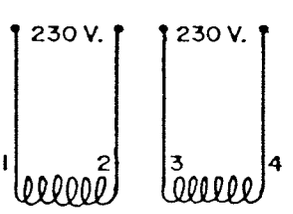
Black - #1
Red - #2
Yellow - #3
Green - #4
Blue - #5
White - #6



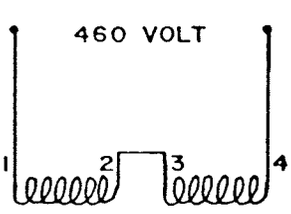
230 VOLT TWO (2) WIRE



230/0/230 VOLT THREE (3) WIRE



DUAL 230 VOLT TWO (2) WIRE

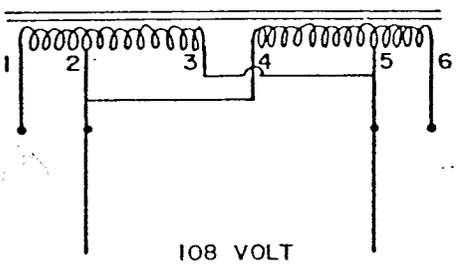


460 VOLT TWO(2) WIRE

AUSTIN LIGHTING TRANSFORMERS

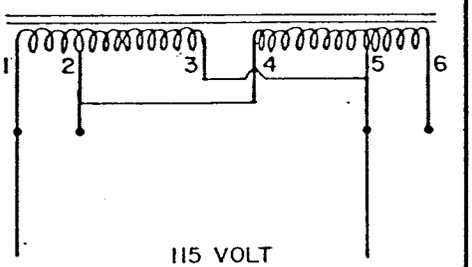
PRIMARY LINE CONNECTIONS FOR TYPES: A-07D1 A-07D2 A-17D1 A-17D2 A-35D1 A-35D2 A-50D1 A-50D2

108 LINE VOLTAGE CONNECTIONS



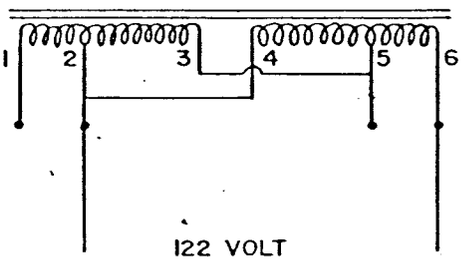
108 VOLT

115 LINE VOLTAGE CONNECTIONS



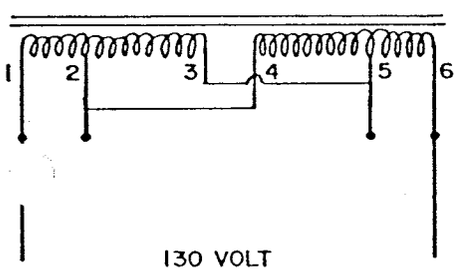
115 VOLT

122 LINE VOLTAGE CONNECTIONS



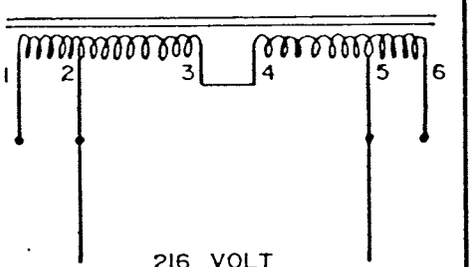
122 VOLT

130 LINE VOLTAGE CONNECTIONS



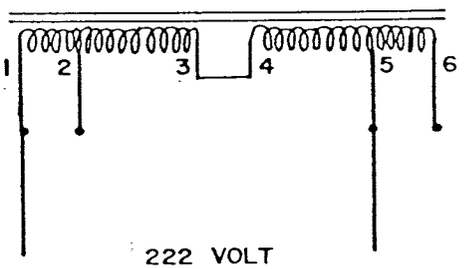
130 VOLT

216 LINE VOLTAGE CONNECTIONS



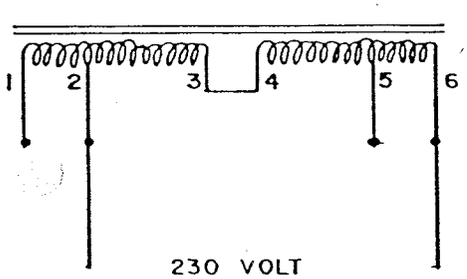
216 VOLT

222 LINE VOLTAGE CONNECTIONS



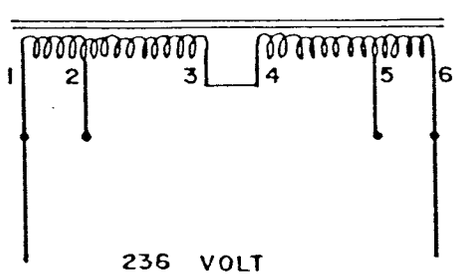
222 VOLT

230 LINE VOLTAGE CONNECTIONS



230 VOLT

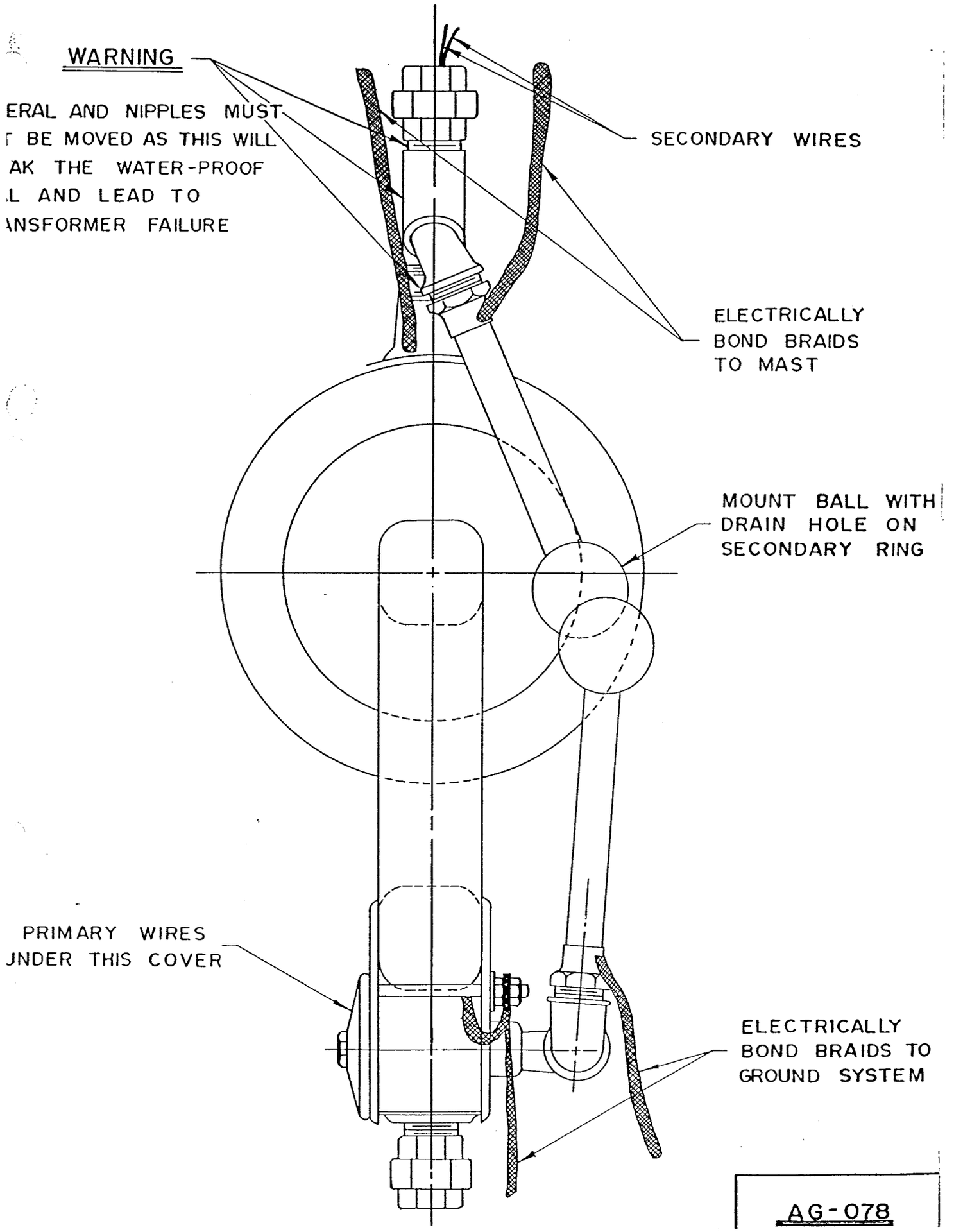
236 LINE VOLTAGE CONNECTIONS



236 VOLT

Black	-	#1
Red	-	#2
Yellow	-	#3
Green	-	#4
Blue	-	#5
White	-	#6

AG-112 MARCH 1977


WARNING
ERAL AND NIPPLES MUST
T BE MOVED AS THIS WILL
AK THE WATER-PROOF
L AND LEAD TO
NSFORMER FAILURE
SECONDARY WIRES
ELECTRICALLY
BOND BRAIDS
TO MAST
MOUNT BALL WITH
DRAIN HOLE ON
SECONDARY RING
PRIMARY WIRES
UNDER THIS COVER
ELECTRICALLY
BOND BRAIDS TO
GROUND SYSTEM
AG-078

AUSTIN LIGHTING TRANSFORMERS

CAUTION - 50 Hz OPERATION

The standard range of Decca Austin Lighting Transformers is designed to be used on 60 Hz or 50 Hz electrical supplies.

It is important to bear in mind that primary no-load current increases as the primary voltage is raised or the frequency lowered. The effect of either is to move the core closer to saturation which must be avoided.

A transformer will have a higher no-load primary current when operated on 50 Hz than it will on 60 Hz.

In particular, on 50 Hz, the measured primary voltage should not be more than 5% higher than the specified voltage for the particular taps selected.

TB - 4 - 78

TRANSIENT PROTECTION

It is well understood in the power distribution industry that transients of several thousand volts peak amplitude can be generated on comparatively low voltage power distribution lines. These transients may be generated by operation of switch gear, lightning strikes, et cetera, and may travel for a considerable distance along the distribution system. In many instances they remain undetected and cause no apparent problem while in other cases they result in damaged insulation and failure of some piece of electrical equipment.

In recent years it has become rather common pratice to run tower lighting power circuits from the distribution point, usually the transmitter building, to the mast or masts using non-shielded buried cable. It is also becoming a more frequent practice to use non-shielded cable on the masts for distributing the power to the various lights and beacons. These practices have increased the liklihood of damage being done to the mast lighting isolation transformer due to transients breaking down the primary or secondary insulation or due to an RF difference in potential between the windings and the frames, cores and shields of the transformer, damaging the insulation.

Every station differs in some respects from all others and if persistent failures of lighting transformers occur then it is likely to be due to RF problems or to high voltage spikes on the power wiring. Nearby lightning strikes are a prolific source of transients on power wiring.

The standard installation instructions sent out with Austin Lighting Transformers recommends, as a normal practice, that good quality by-pass condensers be fitted across the transformer primary and secondary connections if unshielded power wiring is used.

Recent experience has suggested that, particularly on the primary side of the transformer, GE MOV Metal Oxide Varistors (transient suppressors) may be a more effective remedy. The Table attached shows the characteristics of readily available General Electric Varistors. It is recommended that the 230 volt, 40 joule units be used for 115 volt AC rather than the 20 joule units.

RECOMMENDED PROCEDURE FOR INSTALLING VARISTORS

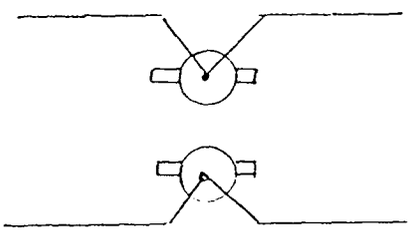
1. Mount as close to transformer as possible - if the coil hut is only a few feet from the mast and if the cable is in conduit or shielded and buried from the coil hut to the mast, mounting in the coil hut should be satisfactory. Otherwise mount at the transformer location in a protective housing.

2. Ground to the same ground as the transformer primary braid is connected - usually the ground mat.

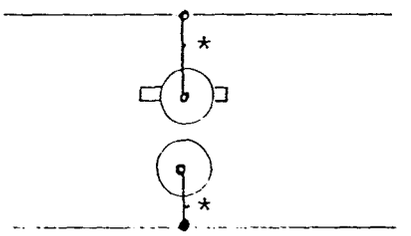
3. Use one on each line even if one side of the line is grounded elsewhere in the electrical system. The exception would be if one line is effectively grounded at the transformer or in the nearby coil hut to the ground mat.

4. Connect into line like:

THIS



NOT THIS



* unless only few inches of heavy wire.

Mount units on a metal plate or ground strap to ensure the impedence to ground is as low as possible.

5. For use on the secondary side of the transformer two Varistors should be used unless one side of the secondary power line is bonded solidly to the mast near the transformer connection. The base of the Varistor should be electrically bonded to the mast with a low impedence bonding strap if it is not mounted on the actual mast structure.

LJD/ika
September 18, 1978

GE-MOV Metal Oxide Varistors

	Max RMS Input Voltage Volts	Max Recur. Peak Voltage Volts	Max. Energy Joules	Max Avg. Power Diss. Watts	Max. Peak Current for tp 6us Amperes
For 115V AC Primary					
V150PA20A V150PA20B V150PA20C	150	212	20	15	2000
For 230V AC Primary					
V250PA40A V250PA40B V250PA40C	250	354	40	13	2000
V275PA40A V275PA40B V275PA40C	275	389	40	13	2000
For 480V AC Primary					
V510PA80A V510PA80B 510PA80C	510	721	80	10	2000
V550PA80A V550PA80B V550PA80C	550	778	80	9	2000

ADS 664

1ST ISSUE Eng'g 7/9/94

CSA Limited,
Knight Road, Rochester, Kent ME2 2AX, England
Telephone (0634) 715544
International: +44 634 715544
Fax: (0634) 715747 Telex: 96146 CSAG

STOCKLIST FOR:- SUPPORT MAST (HLS STYLE) FOR WB230MVE. 34.3m HIGH

DRAWN	CH'KD	APP'D
APB	TC	

DATE 5-7-94

REFERENCE TYPICALLY 1/33711

4SL/34825

ISSUE 1

SHT 1 OF 2 SHTS

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	SECTION - MAST	H.L.S.		15" △ x 12'-6"			AR 54	9	3391F
2	HEADCAP	G.M.S.		6TH. x ⌀572			Q 87	1	2/33447
3	INSULATOR-TOP PLATE	G.M.S.		4SL/33450			R 66M	1	0/33450
4	INSULATOR - BASE	ALUMINA CERAMIC		3"OD x ½"ID x 3"			R 64	1	
5	WASHER - PACKING	LEAD		⌀80 x 1.6mm TH.			R 64A	2	4/25974
6	BASE PLATE	G.M.S.		15 x 254 x 254			O 64M	1	3/33448
7	ARRESTOR - LIGHTNING, UPPER	G.BR.M.S		⌀10 x 95			AR 65M	1	4/33449
8	ARRESTOR - LIGHTNING, LOWER	G.M.S.		USE STANDARD BOLT - M10 x 35 x o x			BF 68	1	
9	NUT - HEX. FULL	G.M.S.		M10			BJ 76	3	
10	WASHER - PLAIN	G.M.S.		M10			BK 85	4	
11	SCREW - PAN HEAD	St.St.		M6 x 16			BH 74	2	
12	STRAP - BASE CONNECTOR	G.M.S.		3 x 25 x 242			CA 64	2	3/4592
13	WASHER - PLAIN	G.M.S.		M16/5/8"			BK 16	4	
14	BOLT - Hx. Hd. x o x	G.M.S		M16 x 40	SECURE ITEM 2 TO MAST		BE 178	3	
15	BOLT - Hx. Hd. x o x	G.M.S		M16 x 45	SECTION/SECTION		BE 94	81	
16	WASHER - SPRING	G.Sp.S.		M16/5/8"			BK 141	84	
17	SHACKLE - DEE	G.M.S.	BS 3032 TABLE 1	5/8" x 3/4" SMALL			BP 151	9	
18	SCREW - RIGGING	G.M.S		3/4" F&F			BP 77	6	
19	THIMBLE - REVING	G.M.S.			DET 1		BN 72	12	4/7397
20	GRIP - GUY, PREFORMED DEAD END	G.M.S.		BWDE 5715831-R			CA 124	12	

ADS 664

1ST ISSUE 7/94

CSA Limited,
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International: +44 634 715544
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STOCKLIST FOR:- SUPPORT MAST (HLS STYLE) FOR WB230MVE. 34.3m HIGH

DRAWN: AB
CH'KD: TE
APP'D: [signature]
DATE: 5-7-94
REFERENCE: TYPICALLY 1/33711
4SL/34825
SHT 2 OF 2 SHTS
ISSUE 1

MASTER

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
21	TERMINATION	AL.AL.		3½T			BQ 68	12	
22	ROPE-STAY. UPPER No 1	PARAFIL	TYPE 'A'	3½T	L=11.5m ±0.1m	BQ 86		3	
23	WIRE-STAY. LOWER No 1	NORSELAY		Ø8 SWR	L=9.7m +0.5m −0	BN 95		3	
24	ROPE-STAY. UPPER No 2	PARAFIL	TYPE 'A'	3½T	L=21.7m ±0.1m	BQ 86		3	
25	WIRE-STAY. LOWER No 2	NORSELAY		Ø8 SWR	L=6.2m +0.5m −0	BN 95		3	
26	ROPE-STAY. UPPER No 3	PARAFIL	TYPE 'A'	7½T	L=31.6m ±0.1m	BQ 70		3	
27	WIRE-STAY. LOWER No 3	NORSELAY		Ø10 SWR	L=5.5m +0.5m −0	BQ 92		3	
28	TERMINATION	AL.AL.		7½T			BQ 69	6	
29	SCREW-RIGGING	G.M.S.		7/8" F&F			BP 24	3	
30	THIMBLE-REAVING	G.M.S.			DETL 2		BN 73	6	4/7397
31	GRIP-GUY. PREFORMED DEAD-END	G.M.S.	-	BWDE 5715844-R			CA 125	6	
2									
3									
4									
5									
6									
7									
8									
9									
0									

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
21	TERMINATION	AL.AL.		3½T			BQ 68	12	
22	ROPE-STAY. UPPER No 1	PARAFIL	TYPE 'A'	3½T	L=11.5m ±0.1m	BQ 86		3	
23	WIRE-STAY. LOWER No 1	NORSELAY		Ø8 SWR	L=9.7m +0.5m −0	BN 95		3	
24	ROPE-STAY. UPPER No 2	PARAFIL	TYPE 'A'	3½T	L=21.7m ±0.1m	BQ 86		3	
25	WIRE-STAY. LOWER No 2	NORSELAY		Ø8 SWR	L=6.2m +0.5m −0	BN 95		3	
26	ROPE-STAY. UPPER No 3	PARAFIL	TYPE 'A'	7½T	L=31.6m ±0.1m	BQ 70		3	
27	WIRE-STAY. LOWER No 3	NORSELAY		Ø10 SWR	L=5.5m +0.5m −0	BQ 92		3	
28	TERMINATION	AL.AL.		7½T			BQ 69	6	
29	SCREW-RIGGING	G.M.S.		7/8" F&F			BP 24	3	
30	THIMBLE-REAVING	G.M.S.			DET L 2		BN 73	6	4/7397
31	GRIP-GUY. PREFORMED DEAD-END	G.M.S.		BWDE 5715844-R			CA 125	6	
2									
3									
4									
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9									
0									

ADS 664

1ST ISSUE [illegible]

CSA

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STOCKLIST FOR:- SUPPORT MAST (PLM STYLE) FOR WB230MYE. 34.3m HIGH

DRAWN	[illegible]
CH'KD	[illegible]
APP'D	[illegible]
DATE	5-7-94
REFERENCE	TYPICALLY 1/33711
	4SL/34539
SHT	2 OF 2 SHTS
ISSUE	1

ADS 664

1ST ISSUE.

CSA Limited,
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International: +44 634 715544
Fax: (0634) 715742 Telex: 96146 CSAG

STOCKLIST FOR:- SUPPORT MAST (PLM STYLE)
FOR WB230MVE. 34.3m HIGH

DRAWN	CH'KD	APP'D	DATE
			5-7-94

REFERENCE 1/33711 TYPICALLY

4SL/34539

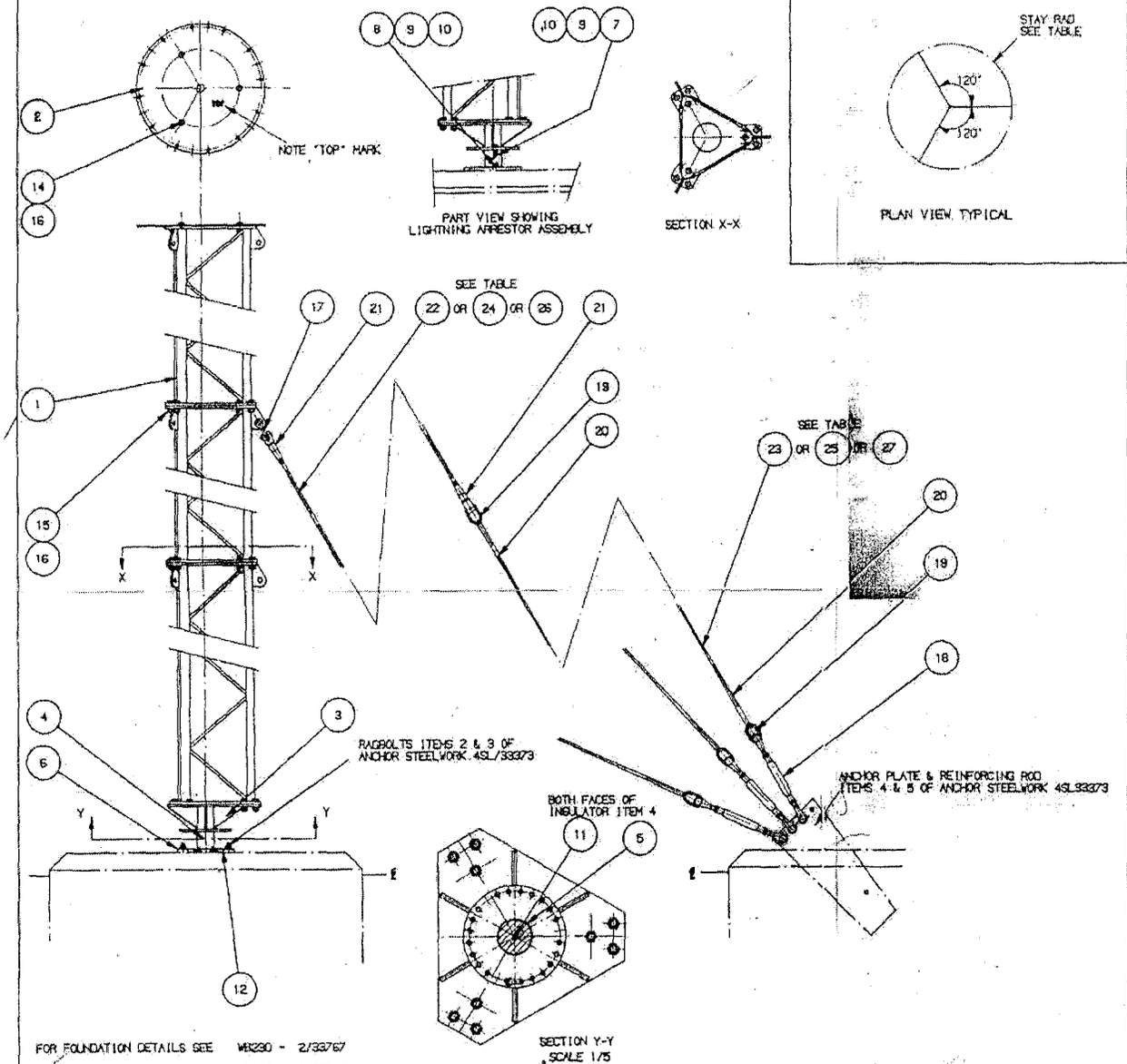
SHT 1 OF 2 SI

ISSUE 1

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	SECTION - MAST	PLM		15" △ x 12'-6"				9	1/28974
2	HEADCAP	G.M.S.		6TH. x ø572			QB 87	1	2/33447
3	INSULATOR-TOP PLATE	G.M.S.		4SL/33450			R 66M	1	0/33450
4	INSULATOR - BASE	ALUMINA CERAMIC		3"ø x 1/2" ø x 3"			R 64	1	
5	WASHER - PACKING	LEAD		ø80 x 1.6mm TH.			R 64A	2	4/25924
6	BASE PLATE	G.M.S.		15 x 254 x 254			O 64M	1	3/33448
7	ARRESTOR - LIGHTNING, UPPER	G.BR.M.S		ø10 x 95			AR 66M	1	4/33449
8	ARRESTOR - LIGHTNING, LOWER	G.M.S.		USE STANDARD BOLT - M10 x 35 xox			BF 68	1	
9	NUT - HEX. FULL	G.M.S.		M10			BJ 76	3	
10	WASHER - PLAIN	G.M.S		M10			BK 85	4	
11	SCREW - PAN HEAD	St St		M6 x 16			BH 74	2	
12	STRAP - BASE CONNECTOR	G.M.S.		3 x 25 x 242			CA 64	2	3/4592
13	WASHER - PLAIN	G.M.S.		M16/5/8"			BK 16	4	
14	BOLT - Hx. Hd. xox	G.M.S		M16 x 40	SECURE ITEM 2 TO MAST		BE 178	3	
15	BOLT - Hx. Hd. xox	G.M.S		M16 x 45	SECTION/SECTION		BE 94	81	
16	WASHER - SPRING	G.Sp.S.		M16/5/8"			BK 141	84	
17	SHACKLE - DEE	G.M.S.	BS 3032 TABLE 1	5/8" x 3/4" SMALL			BP 151	9	
18	SCREW - RIGGING	G.M.S		3/4" F&F			BP 77	6	
19	THIMBLE - REAVING	G.M.S.			DET - 1		BN 72	12	4/7397
	PREFORMED						CA		

DO NOT SCALE

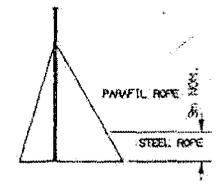
IF IN DOUBT, ASK



THIRD ANGLE PROJECTION

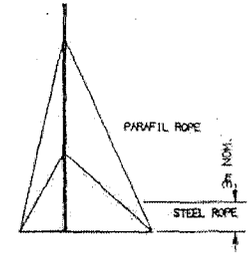
ANTENNA TYPE WB4530
STOCKLIST 4SL/33383
MAST HEIGHT 15.55m
STAY RADIUS 7m

STAY No	STAY ITEM No		TAKE OFF HEIGHT m
	UPPER	LOWER	
1	22	23	11.66m



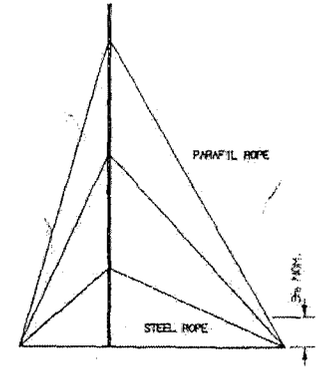
ANTENNA TYPE WB330
STOCKLIST 4SL/33382
MAST HEIGHT 23.17m
STAY RADIUS 12m

STAY No	STAY ITEM No		TAKE OFF HEIGHT m
	UPPER	LOWER	
2	24	25	19.29m
1	22	23	7.66m



ANTENNA TYPE WB230
STOCKLIST 4SL/33381
MAST HEIGHT 34.60m
STAY RADIUS 18m

STAY No	STAY ITEM No		TAKE OFF HEIGHT m
	UPPER	LOWER	
3	26	27	30.78m
2	24	25	19.29m
1	22	23	7.66m



FOR FOUNDATION DETAILS SEE WB230 - 2/33767
WB230 - 2/33768
WB4530 - 2/33769

FOR ADVANCED ANCHOR STEELWORK SEE 4SL/33373

FOR ERECTION INSTRUCTIONS & STAY TENSIONS SEE HANDBOOK E11C08

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE SPECIFIED

TOLERANCES

UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS:

NO PLACE DECIMAL ±
ONE PLACE DECIMAL ±
TWO PLACE DECIMAL ±
HOLE DIAMETER ±
ANGLES ±

CSA
CSA Limited, Knight Road, Rochester, Kent ME2 2AX, England. Telephone: 0634/718644. International: +44 634 718644. Fax: [illegible] Telex: 96146 CSAG.

SUPPORT MAST (HLS FOR WB ANTENNA

DRAWN	DATE	SCALE
GMK	6-2-88	1/7
CHKD	DATE	REVISION

1/33711

ADS 664

MASTER

GSA
GSA Limited
Knight Road, Rochester, Kent ME2 2AX, England
Telephone: (0634) 715544
International: +44 634 715544
Fax: (0634) 715742 Telex: 96146 GSAG

STOCKLIST FOR:- ANTENNA CURTAIN FOR WB230 MVE.

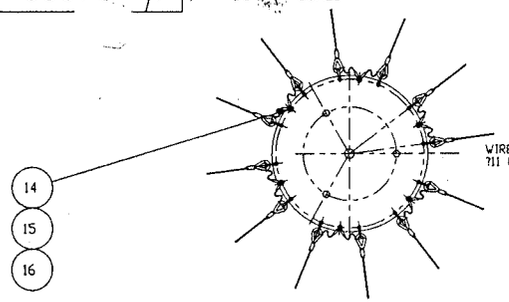
DRAWN	APP'D	CH'KD	DATE	REFERENCE	SHT	ISSUE
			26-1-94	4SL/34629	1 OF 1 SHTS	1

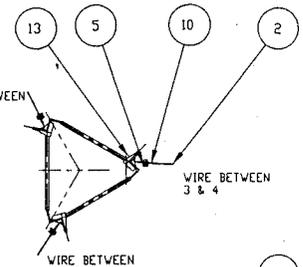
ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	WIRE-ANTENNA-UPPER			4SL/34630				12	3/34630
2	WIRE-ANTENNA-LOWER			4SL/33460	DET 1			24	3/33460
3	WIRE-SPACER			4SL/33461	DET 1			24	3/33461
4	ROPE	PREFIL	2T.	TYPE A X38-1/H CUT.		BQ 88		12	
5	BRACKET	ST.ST.		3x20x76 (1/8"x3/4")			BR 46	24	3/4588
6	PLATE-LINK	ST.ST		3x20x70 (1/8"x3/4")			AR 101	12	4/33462
7	TERMINATION	AL AL		2T PCM TYPE A			BQ 76	24	
8	SHACKLE-BOW	ST.ST		6x6 (1/4"x1/4")			BP 150N	24	
9	SHACKLE-DEE	ST.ST		6x6 (1/4"x1/4")			BP 84	36	
10	TAP-LINE	TINNED BRASS		HJ10 (OR EQUIV.)			P 42	60	
11	CHAIN LONG LINK	GHTS.	BS1663 GD40	5/16 DIA (1/D 12x32)			P 123	12	
12	SCREW-RIGGING	G.M.ST		1/2" F&F			BP 78	12	
13	LINDAPTER	G.M.ST		TYPE F2/M10			EM 78	3	
14	BOLT-Hx Hd.	ST.ST.		M6x30			BH 75	6	
15	WASHER-PLAIN	ST.ST		M6			BK 82	12	
16	NUT-Hx.SELF.LOCK	ST.ST.		M6			BJ 73	6	
17	WASHER-PLAIN	ST.ST		M10			BK 91	20	
18	SCREW-Hx.HD.	ST.ST.		M10x30			BH 335	20	
19	NUT-Hx.FULL	ST.ST.		M10			BJ 84	20	
.0	SUPPLY ALSO, 1 COPY OF THIS STOCKLIST.								

DO NOT SCALE

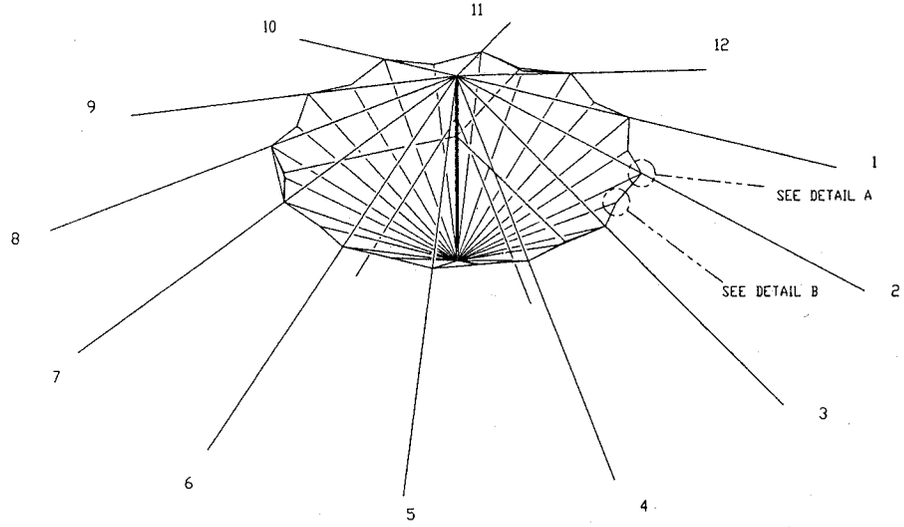
IF IN DOUBT, ASK

THIRD AN PROJECT

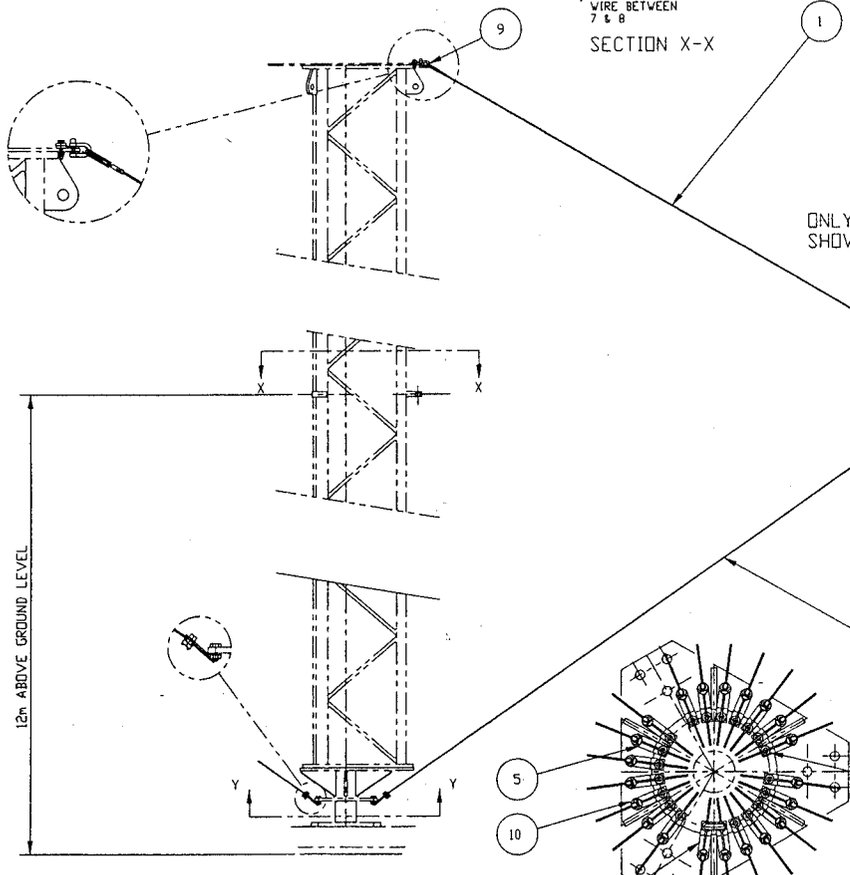


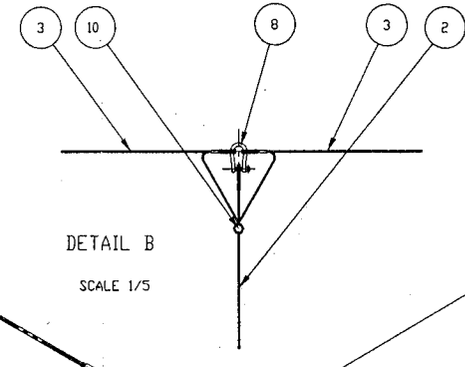


SECTION X-X



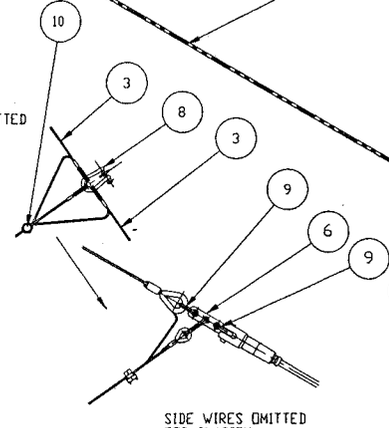
ISOMETRIC VIEW





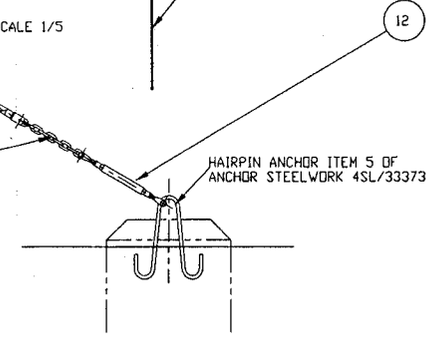
DETAIL B

SCALE 1/5



DETAIL A

SCALE 1/5



1 POSITION ONLY
BRACKET ITEM 5 ATTACHED USING LIGHTNING ARRESTOR ITEM 7 1/33711

SECTION Y-Y

SCALE 1/5

FOR STOCKLIST 4SL/34629

FOR FOUNDATION DETAILS SEE RELEVANT SITE LAYOUT

FOR PARAFIL (ITEM 4) TERMINATION, REFER TO INSTRUCTION HANDBOOK OR RAFSEE DRG. No 90G 116240

FOR ADVANCED ANCHOR STEELWORK SEE 4SL/33373

FOR ERECTION INSTRUCTIONS & STAY TENSIONS SEE RELEVANT HANDBOOK

FOR MAST ASSEMBLY SEE DRG No 1/34585

GENERATED USING AutoCAD 2000/AM04
STORED UNDER FILE NAME 34629_1

ISSUE	CHANGE NOTE No.	DATE	APP'D
1	7823	26.1.94	RLT

ORIGINAL FRAME SIZE 601 X 354

MATERIAL

FINISH

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	±0.5mm
ONE PLACE DECIMAL	±0.25mm
TWO PLACE DECIMAL	±0.15mm
HOLE CENTRES	±0.25mm
ANGLES	±1.0°

CSA Wireless
A Wireless Global Company
CSA Limited,
Knight Road, Rochester, Kent, ME2 2AX, England.
Telephone: (01634) 715544
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Fax: (01634) 715742

TITLE
ANTENNA CURTAIN
FOR WB230MVE ANTENNA

DRAWN	DATE	SCALE
LRK	26.1.94	1:10
CHK. APP'D	QA APP'D	REFERENCE
RLT	RLT	

1/ 34629 ISSUE 1

Issue 1-93

Iss 6/91. RE

ADS 664

GSA Limited
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Fax (0634) 715742 Telex 96146 CSAG

STOCKLIST FOR- EARTH MAT (COUNTERPOISE) FOR WB 230 ANTENNA. (EM72/48)

DRAWN: AFD
APP'D: [illegible]
DATE: 20/6/91
CH'KD: TE
REFERENCE: 2/33710
SHT 1 OF 1 SHTS
ISSUE 2

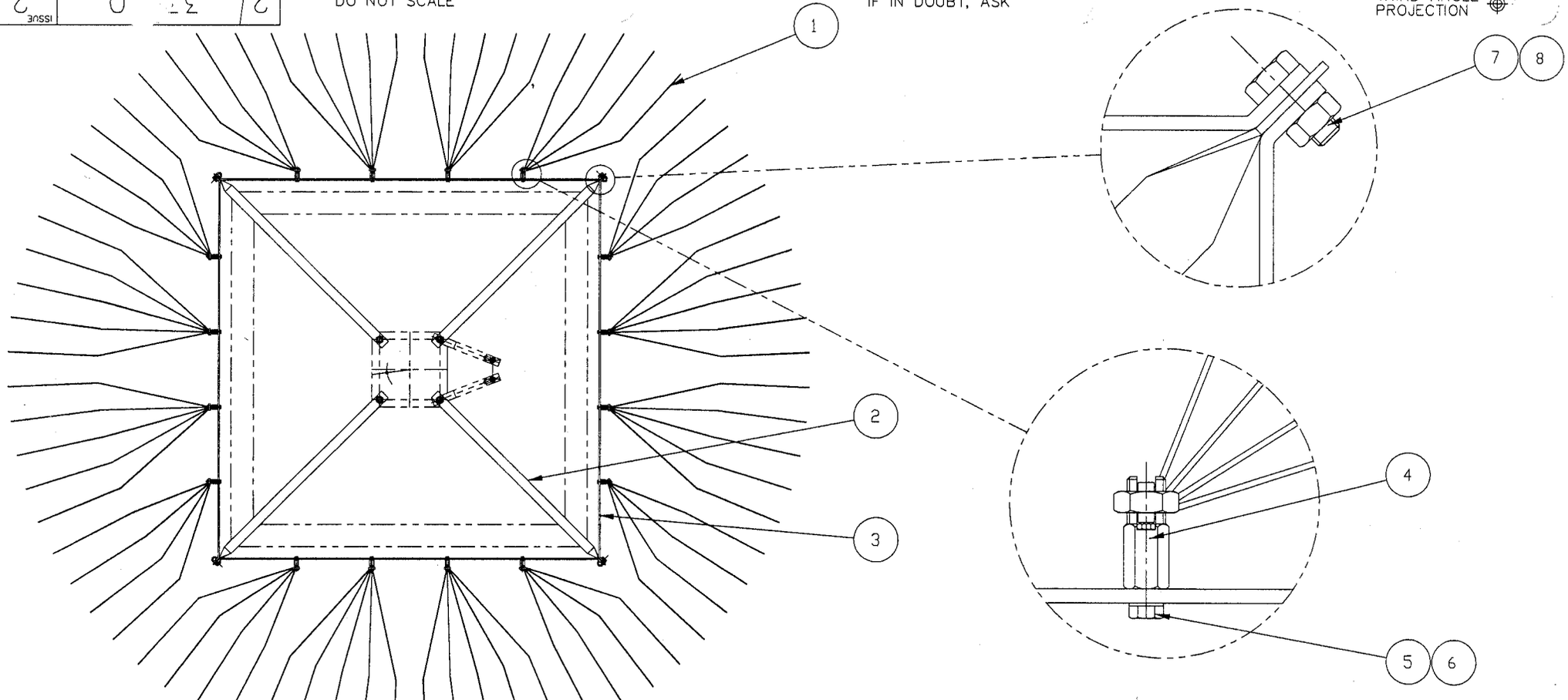
4SL/32375

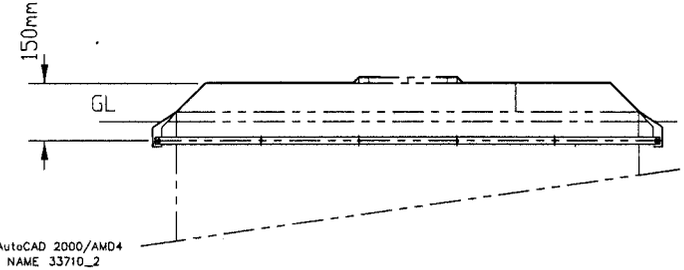
ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	WIRE - EARTH.	SOFT COPPER		Ø2 x BULK LENGTH (4x25M BUNDLE)	CUT 0.5 STR 720 OFF x 48m	E 12		3460m.	
2	STRIP - EARTH CONNECTION	COPPER		3 x 32 x 915		E 80		4	3/4680
3	STRIP - EARTH TERMINATION	COPPER		5 x 19 x 1229		E 17		4	3/4681
4	'T' CONNECTOR	TINNED BRASS		HJ10TM			P 114	16	A/33523
5	SCREW - Hx. Hd.	ST. ST.		M6 x 12			BH 70	16	
6	WASHER - PLAIN	ST. ST.		M6			BK 82	16	
7	SCREW - Hx. Hd.	ST. ST.		M10 x 25			BH 356	4	
8	NUT - Hx. FULL	ST. ST.		M10			BF 84	4	
9									
0									
1									
2									
3									
4									
5	SUPPLY ALSO 1 COPY OF THIS STOCKLIST, & 2/33710.								
6									
7									
8									
9									
0									

DO NOT SCALE

IF IN DOUBT, ASK

THIRD ANGLE PROJECTION





72 EQUISPACED RADIALS
FOR LENGTH SEE TABLE
BURIED 150mm DEEP

ALL CORNERS, BOLTS & EARTH WIRES
TO BE BRAZED AFTER INSTALLATION

DETAIL No	RADIAL LENGTH	CODE	ANTENNA	STOCKLIST No
1	48m	EM72/48	WB230	4SL/33375
2	36m	EM72/36	WB330	4SL/33376
3	24m	EM72/24	WB4530	4SL/33377

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILE NAME 33710_2

SCALE 0

ORIGINAL FRAME SIZE 390 X 541

ISSUE	CHANGE NOTE No	DATE	APP.D
2	7682	1.93	JG
1	7413	1.92	RLT

MATERIAL

FINISH

ALL DIMENSIONS IN MILLIMETRES (mm)
UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED
TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	–	±0.5mm
ONE PLACE DECIMAL	–	±0.25mm
TWO PLACE DECIMAL	–	±0.15mm
HOLE CENTRES	–	±0.25mm
ANGLES	–	±1.0°

CSAWireless
A TriPoint Global Company

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TITLE
EARTH MAT (COUNTERPOISE)
WB ANTENNA

DRAWN	DATE	SCALE
LRK	24.1.92	1:10
ENG. APP'D	QA APP'D	REFERENCE
RLT	RLT	

2/33710 ISSUE 2

ADS 664

1st. Iss. 6/91 RAT

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Fax: (0634) 715742 Telex: 96146 CSAG

STOCKLIST FOR:- ANCHOR STEELWORK FOR WB SERIES, ALSO BCM7 ANTENNA.

DRAWN: APD
APP'D: [illegible]
DATE: 26/9/91
CH'KD: TC
REFERENCE: 4SL/33373
ISSUE: 1
SHT 1 OF 1 SHTS

MASTER

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	TEMPLATE - BASE SETTING	PLYWOOD		12 x 560 x 813			CA 68	1	3/4702
2	RAGBOLT & NUT	G.M.ST		M16 x 200			BE 45	4	
3	RAGBOLT & NUT	G.M.ST		M10 x 100			BF 30	2	
4	PLATE - ANCHOR	G.M.ST.					N 68	3	2/6728
5	ANCHOR - HARPIN	G.M.ST		ϕ12			N 1	13	3820Q
6	ROD - REINFORCING	M.ST.		ϕ16 x 300			N 67	3	4/7484
7									
8									
9									
0									
1									
2									
3	SUPPLY ALSO 1 COPY OF THIS STOCKLIST.								
4									
5	IF ANCHOR STEELWORK IS REQUIRED TO BE SUPPLIED IN ADVANCE OF								
6	THE MAIN SUPPLY, AND MAST OBSTRUCTION LIGHTING IS PART OF								
7	CUSTOMER'S ORDER, ENSURE THAT RAG BOLTS, (PART OF LIGHTING EQUIPMENT) ARE								
8	INCLUDED IN ADVANCE SHIPMENT.								
9	FOR WB, MAST LIGHTING WLN, RAG BOLT IS ITEM 3 OF 4SL/33453								
0	FOR BCM7, MAST LIGHTING BLN 7, RAG BOLT IS ITEM 3 OF 4SL/33463								

ADS 664

1st Iss 7/91 Rue

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Knight Road, Rochester, Kent ME2 2AX, England
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Fax: (0634) 715742 Telex: 96145 CSAG

STOCKLIST FOR:- 1 5/8" EIA / OPEN WIRE ADAPTOR KIT.

APP'D	DRAWN
DJR	AJP

DATE	CH'KD
3/7/91	TC

REFERENCE
4SL/33369

ISSUE	SHT
1	1 OF 1 SHTS

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	BRACKET - SUPPORT	GMS		100x5x75.				1	3/33372
2	ADAPTOR - 1 5/8" EIA TO OPEN WIRE			4SL/4873				1	4/4873
3	SCREW - Hex. Hd.	St.St.		M8x20			EH 95	3	
4	WASHER - PLAIN	St.St.		M8/5/16			BK 83	3	
5	COUNSUNK WIRE ASSY			SEE 3815P	Det 1			1	3815P
6									
7									
8									
9									
0									
1									
2									
3									
4	SUPPLY ALSO 1 COPY OF THIS			STOCKLIST, &	3/33369.				
5									
6									
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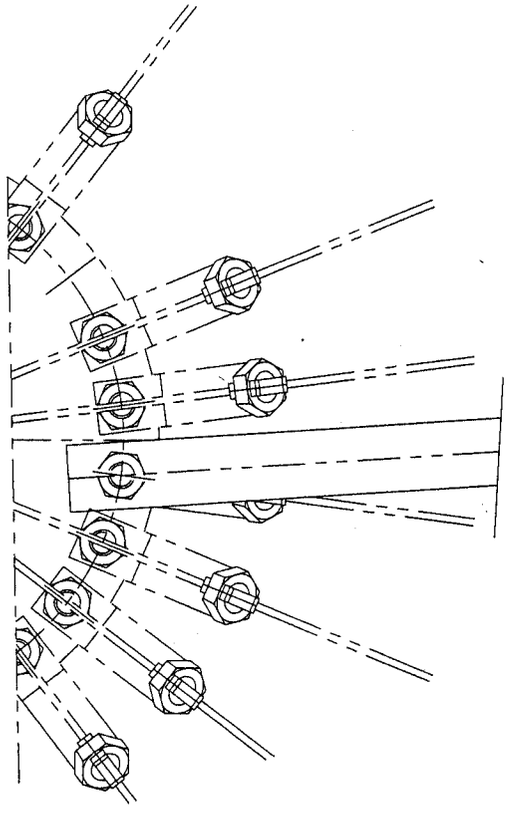
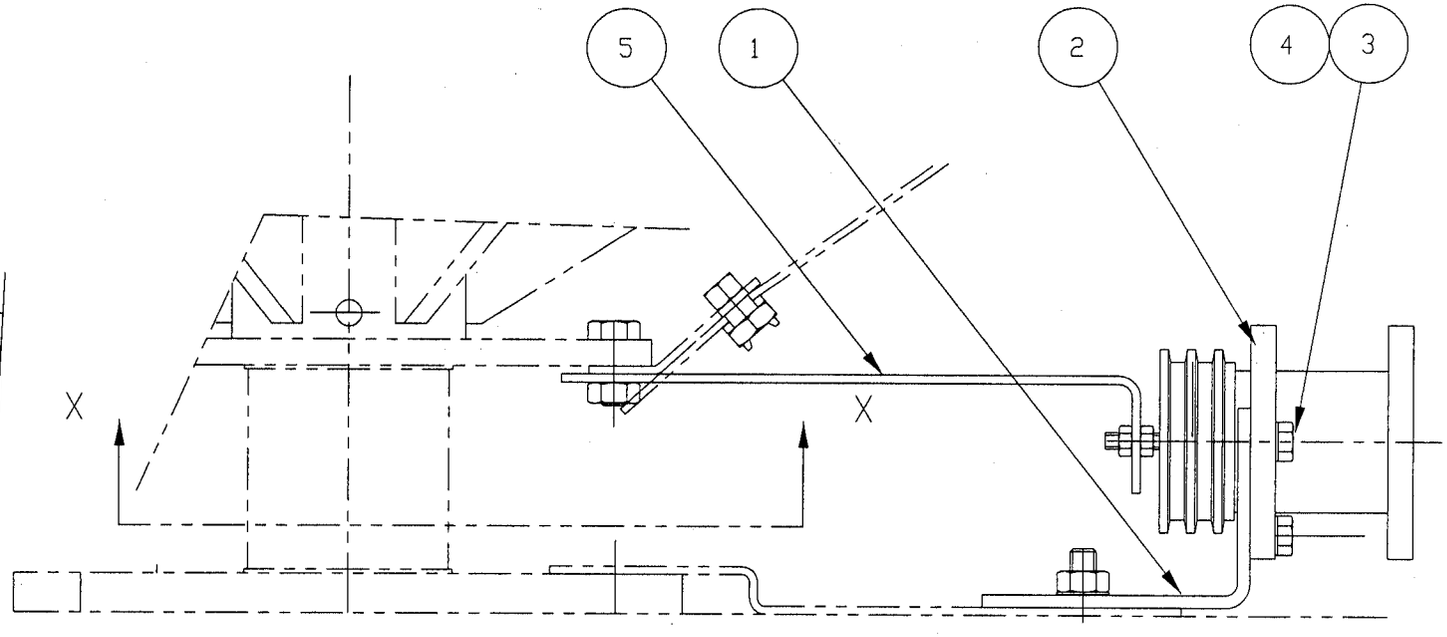
8									
9									
0									

DO NOT SCALE IF IN DOUBT, ASK THIRD ANGLE PROJECTION





PART SECTION X-X

OPEN WIRE ADAPTOR SHOWN
MOUNTED ON A WB BASE

FOR STOCKLIST SEE 4SL/33369

SCALE 0

ORIGINAL FRAME SIZE 284 X 407

ISSUE	CHANGE NOTE No	DATE	APP'D
1	FIRST	1.92	RLT

GENERATED USING
AutoCAD 2000/AMD4
STORED UNDER FILENAME
33369_1

TOLERANCES
UNLESS OTHERWISE STATED
TOLERANCES TO BE AS FOLLOWS :-

NO PLACE DECIMAL	±0.5mm
1 PLACE DECIMAL	±0.25mm
2 PLACE DECIMAL	±0.15mm
HOLE CENTRES	±0.25mm
ANGLES	±1.0°

ALL DIMENSIONS IN MILLIMETRES (mm)
UNLESS OTHERWISE SPECIFIED

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Fax: (01634) 715742

MATERIAL | FINISH

TITLE: 1 5/8" SOCKET / OPEN WIRE ADAPTOR KIT

DRAWN	DATE	REFERENCE	SCALE
LRK	24.1.92		1:2
ENG. APP'D: RLT	QA APP'D: RLT	3/ 33369	ISSUE: 1

ITEM	DESCRIPTION	MATERIAL	STOCK SIZE & Nº	QTY.	REMARKS	DRG. Nº
1	Lighting Transformer		Austin Type A-07D1	1		
2	Conduit Transformer Support	Galvd.MS	1"1/DIA.WATER PIPE x 3'-0 3/8" LG.	1	DETAIL 4	4/6491
3	Adaptor:Transformer to supply	Brass	1 5/16" DIA. x 2"	1		4/19798
4	Adaptor:Conduit to cable	"	1 5/8" DIA. x 2 1/4"	1		4/19799
5	"U" Bolt:Standard	Galvd. MS	Details No. 2	2	BN-71.	C12500
6	Conduit Packer	" "	See Drawing	1		4/4934
7	Conduit Support Plate	" "	See Drawing	1		4/4935
8	Conduit Support Angle	" "	See Drawing	3	N-69.	3/4936
9	Cable Clip	Zinc Plated	F.T. Ltd. Cat. No. 36070	See Sh. 2	CA73.	
10	MOUNTING BRACKET	MST GALV.	15 x 5 x 2.5 LG	2		4/28336
11	'V' BOLT	GALVD.M.S.	DET. 10 OF DRAWING	2		2800Q
12	Cable (FUSE BOX/TRANS')		SEE 4SL/16899	1	DET. 2 OF DRG.	4/16899
13	SPANNER. PLUG.	STEEL	1/2" BS.	1	BP 37	
14	GEC Neon Light Fitting	Alloy	Type ZA-750	1	AR-78	
15	End Plug	Polythene	1 1/2" x 10 swg	2	Seldex No. A131	
16	Transformer Support Channel	Galvd M.S.	SEE 3/4912	1	CB79.	3/4912
17	Bolt HX HD XOX	" "	1"1/2 x 40.	5	Seldex No. BE 79	
18	Full Nut HX HD	" "	3/8"WHIT	4	" No. BJ16	
19	Spring Washer Single Coil	" "	3/8" I/D	9	" No. BK 27	
20	SCREW-Hx.Hd.	" "	M10 x 30.	3	" " BE 85	
21	Full Nut HX HD	" "	3/8"WHIT	4	BJ36	
22	Plain Washer	" "	3/8" I/D	7	BK-41	
23	Bolt HX HD XOX	" "	3/8"WHIT x 1 1/2" Lg.	7	Seldex No. BE 39	
24	SPANNER. D.O.E.	STEEL	2BA x 0BA	1	BP 48	
25	Plain Washer	GALVD. M.S.	5/16" I/D	7	BK-16	
26	VARISTOR		Z 20E	4	8084	
27	Line Tap	TinnedBrass	H.D.10 OR EQUIV.	2	Seldex No. P43	
28	Connecting Strop	Cad.Copp.	7/048 x 0.3 m ±0.02m. TIN 30mm EACH END	2	Seldex No. E.19	
29	Rag Bolt	GALVD MS.	M12 x 160 C/W NUT	2	Seldex No. BE 80	
30	Plain Washer	" "	1/2" I/D	2	BK-25	

TITLE
GENERAL ARRANGEMENT OF TRANSFORMER MOUNTING AND OBSTRUCTION LIGHTING - PRODUCT CODE OLN-WB-230, OLN-WB-330, OLN-WB-4530.
WB SERIES.

SHEET Nº 1 OF 2 SHEETS

DRAWN
CHKD
APPD
ISSUE 1 10187

4SL / 10187

ISSUE 20

C & S Antennas Ltd.
Kingsnorth Road, Strood, Kent.

GENERAL ARRANGEMENT OF TRANSFORMER MOUNTING & OBSTRUCTION LIGHTING FOR WB. SERIES.
PRODUCT CODE OLN-WB-230, OLN-WB-330, OLN-WB-4530.

SHEET No. 2 OF 2 SHEETS

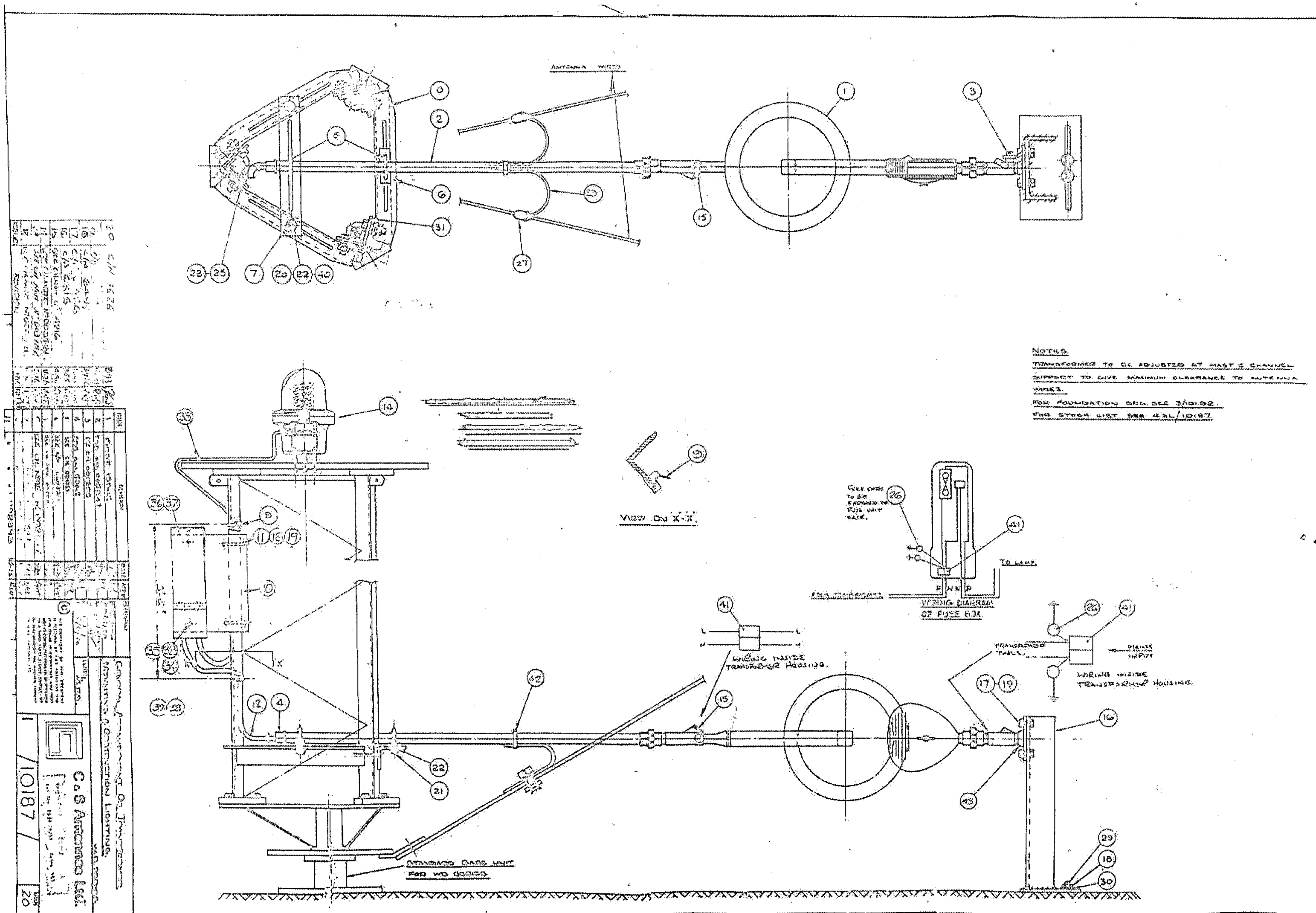
DRAWN B.J.H.
CHKD
APP'D
DATE 11/10/87

ASL/10187

ISSUE 20

C&C Antennas Ltd
KNIGHT ROAD, ROCHESTER, KENT ME2 2AX ENGLAND

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK NO. RAW MAT'L.	STOCK NO. FINISHED	QTY.	DRG. No.
31	BRACKET	GALV'D. MILD ST.	BS4360	MK.2.			P58	3	3904 H
32	CH. HD. SCREW	ST. ST.		2BA. x 1¼" LG.			CD-6	3	
33	CABLE (LAMP/FUSE BOX)			SEE ASL/16899	SEE TABLE BELOW			1	4/16899
34	HEX. FULL NUT	ST. ST.		2BA.			BI-2	3	
35	SPRING WASHER	ST. ST.		2BA.			CC-7	3	
36	FUSE UNIT. ASSY.			215/KSH	SEE NOTE *		EL97	1	MEM
37	FUSE WIRE	5A.			SEE NOTE *			0.1	
38	REDUCING. SOCKET.	MCI. GALV.		25x20mm LISTN° F744G	WALSALL			2	
39	LOCKNUT	MS GALV.		25mm LISTN° F746G	WALSALL			2	
40	NUT-HEX. FULL	GMS		M10			BJ76	3	
41	TERMINAL BLOCK	PLASTIC	10A	8 WAY MOULDED STRIP	CUT UP ON SITE TO SUIT.			1	
42	CLIP-WORM DRIVE	ST. ST.		SIZE N° 162(ix)				1	
43	MOUNT.-TRANSFORMER			TYPE A-1761	RACAL-DECCA AUSTIN.			1	
4					* NOTE:- ITEM 36 MUST HAVE THE 5A				
5	SUPPLY 1 COPY OF	1/10187 & ASL/10187			FUSEWIRE REMOVED & REPLACED WITH ITEM 37. ANY REFERENCE TO 5A ON THE FUSEHOLDER				
6	PRODUCT CODE:-		QTY. OF ITEM 9	ITEM 33 DETAIL REQ'D.	MUST BE GROUND OFF & 5A PAINTED ON (AN ACCEPTABLE ALTERATIVE IS TO				
7	OLN-WB-230.		33	DET:- 1 OF 4/16899	GRIND AWAY JUST THE ONE (1) FROM 15A & HIGHLIGHT THE 5A IN WHITE				
8	OLN-WB-330		22	" 3 " "	PAINT. OTHER PERMANENT OBLITERATION				
9	OLN-WB-4530		15	" 4 " "	METHODS ACCEPTABLE.				
0	NOTE: QTY'S. OF BOLTS NUTS & WASHERS, INCLUDE SPARES.								



ANTENNA WIRES
NOTES.
TRANSFORMER TO BE ADJUSTED AT MAST & CHANNEL SUPPORT TO GIVE MAXIMUM CLEARANCE TO ANTENNA WIRES.
FOR FOUNDATION DRG. SEE 3/10192.
FOR STOCK LIST SEE 4SL/10187.
VIEW ON 'X-X'
TO LAMP.
WIRING DIAGRAM OF FUSE BOX
WIRING INSIDE TRANSFORMER HOUSING.
TRANSFORMER TAILS
MAINS INPUT
C & S ANTENNAS LTD.
10187
20

TITLE SAFETY RAIL FOR PLM MAST. SUITABLE FOR WB 230 o/s (MAST HEIGHT – 112·5') PLM MAST.

SHEET No. 1 OF 1 SHEETS

DRAWN AED CH'KD BHS APP'D BHS REF.

GSA

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International: +44 634 715544
Facsimile: 0634 715742 Group 3
Telex: 96148 CSAG
Cables: CSA ROCHESTER

4SL/34552 MASTER

ISSUE 1

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK NO. RAW MAT'L.	STOCK NO. FINISHED	QTY.	DRG. No.
1	SAFETY RAIL KIT			4SL/30006	BARROW HEPBURN			11	
2	BOLT HEX. HD C/W NUT	ST. ST Z & P		M8 x 40 (END STOP)	11		BH 382	1	
3	SAFETY BELT				11		T17.	1	
4	RAIL TROLLEY				11		T8	1	
5									
6									
7	ALL ITEMS PART OF 'RAILOK' SAFETY SYSTEM.								
8	NOTE: THE FOLLOWING ITEMS ARE TO BE SUPPLIED ALSO								
9	1. COPY OF THIS STOCKLIST – 4SL/34552								
0	2. COPY OF ASSY DRAWING – 3/26953								
1	3. COPY OF RAIL KIT STOCKLIST – 4SL/30006								
2	4. COPY OF RAIL INSTAL'N INSTRUCTIONS – EI-1123								
3									
4									
5	FOR TYPICAL ASSY DETAILS. REFER TO DRWG 3/26953.								
6	NOTE – ITEMS 3 & 4 ARE ALWAYS SUPPLIED UNLESS								
7		SPECIFIED OTHERWISE.							
8									
9									
0									

TITLE: SAFETY RAIL KIT (3.05M LENGTH) HLS MAST (45x45x5/LEG)

SHEET No. 1 OF 1 SHEETS

REF.	APP'D	CH'KD	DRAWN
			G.FORD

4SL / 32826

ISSUE 1

C & S Antennas Ltd, Knight Road, Rochester, Kent, ME2 2AX, England.
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Facsimile: 0634 715742 Group 3
Telex: 96148 CSAG
Cables: CSA ROCHESTER

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK NO. RAW MAT'L.	STOCK NO. FINISHED	QTY.	DRG. No.
1	SAFETY RAIL	AL AL	HE30TE	50W x 3.05M	BARROW HEPBURN.			1	
2	JOINT PLATES	〃	〃	TO SUIT ITEM 1 C/W NUTS & BOLTS	〃			1 PR	
3	ANGLE CLIP (2 PIECE)	〃	〃	TO SUIT HLS MAST 45x45x5	〃			3	
4	SPACER	〃	〃	100MM LG.				3	
5	BOLT	ST. ST. Z & P		M10 x 180 LG				3	
6	BOLT	〃		M10 x 25 LG	〃			3	
7	LOCKNUT	〃		M10	〃			6	
8	WASHER	NYLON		M10	〃			3	
9									
0									
1	ALL ITEMS PART OF 'RAILOK' SAFETY SYSTEM.								
2	NOTE - FOR TYPICAL ASSY DETAILS. REFER TO DRWG 3/26953.								
3									
4									
5									
6									
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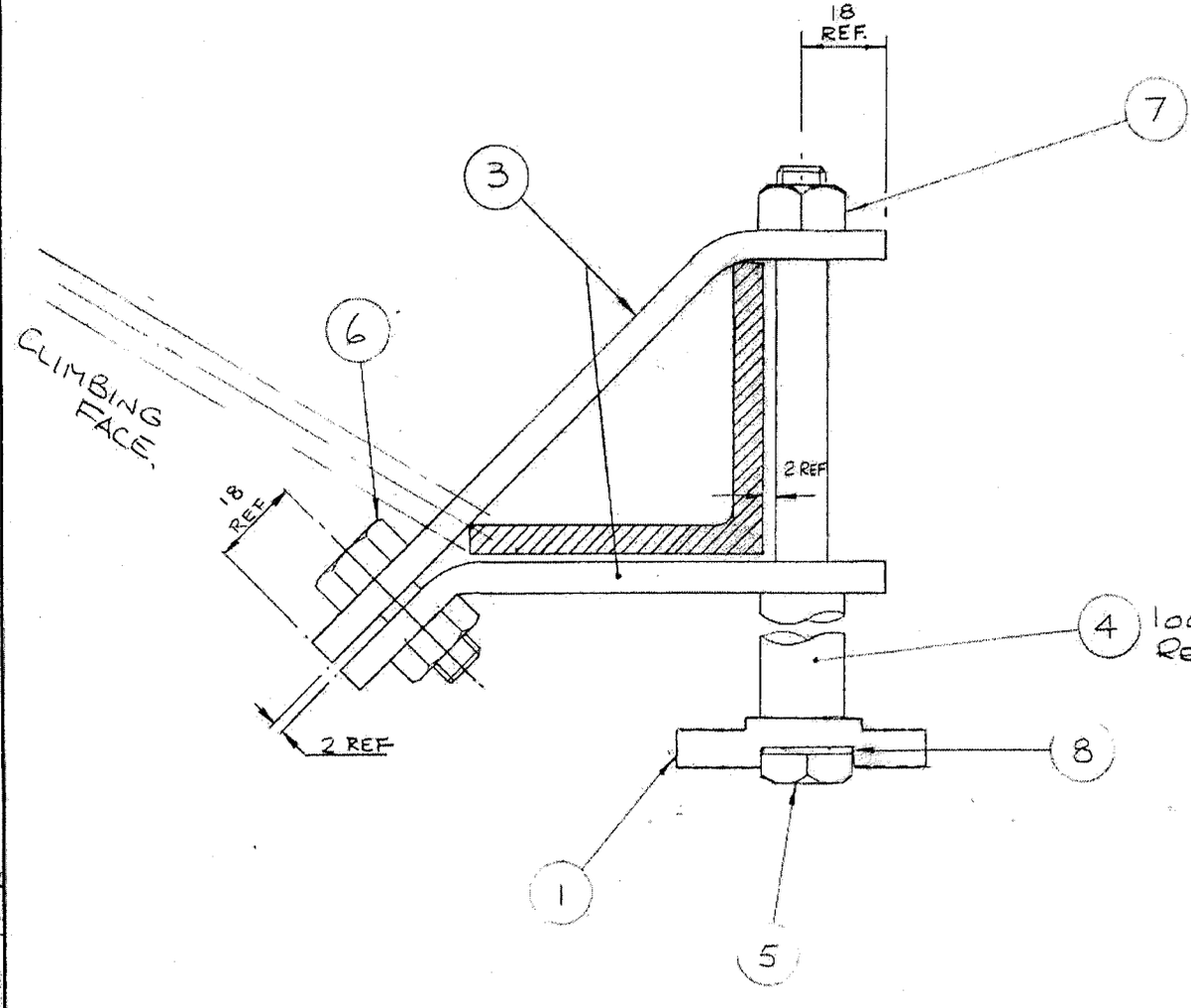
THIRD ANGLE PROJECTION



FOR HLS MAST (4S/) STOCKLIST, SEE 4SL/32826
FOR PLM MAST (5Q) STOCKLIST, SEE 4SL/30006

C/N 6789 ISSUE 2 12-88	C/N 6912 ISS 3 3-7-89	ISS. 4 C/N 7139 5-90

NOTES	REFERENCE STANDARD.	SAFETY RAIL KIT (3·05m LENGTH) ANGLE LEG.

DRAWN R.H.D.
CH'KD
APP'D
SCALE N.T.S.

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Facsimile: 0634 719742 (Group 3)
Telex: 96148 CSAG
Cables: CSA ROCHESTER

3 / 26953 / ISSUE 4.

TITLE SAFETY RAIL KIT (3·05 m LENGTH) PLM STYLE MAST (50 x 50 x 8)

SHEET No. 1 OF 1 SHEETS

DRAWN R.H.D.

CH'KD

APP'D

REF STANDARD

4SL / 30006

ISSUE 4

G & S Antennas Ltd, Knight Road, Rochester, Kent, ME2 2AK England
Tel: 0634 715544 International: +44 634 715544
Facsimile: 0634 715742 Group 3
Telex: 96146 GSAG Cables: GSA ROCHESTER

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK NO. RAW MAT'L.	STOCK NO. FINISHED	QTY.	DRG. No.
1	SAFETY RAIL	AL. AL.	HE 30TE	50 WIDTH X 3·05 LG G SECTION (TOP HATS)	BARROW HEPBURN			1	
2	JOINT PLATES	AL. AL.	HE 30TE	TO SUIT ITEM 1 INCL. NUTS & BOLTS				1 PR	
3	ANGLE CLIP (2 PIECE)	AL AL	HE 30TE	TO SUIT PLM MAST 50x50x8				3	
4	SPACER	AL. AL	HE 30TE	105 mm LG				3	
5	BOLT	ST. ST Z & P		M10 X 200 LG				3	
6	BOLT	ST. ST Z & P		M10 X 25				3	
7	LOCKNUT	ST. ST. Z & P		M10				6	
8	WASHER	NYLON		M10				3	
9									
0									
1									
2	ALL ITEMS PART OF 'RAILOK' SAFETY				SYSTEM.				
3	FOR TYPICAL ASS'Y REFER TO DR'G. N° 3/26953.								
4									
5									
6									
7									
8									
9									
0									

TITLE EARTHING SYSTEM FOR MAST BASE UNIT LTS/HTS

SHEET No. 1 OF 1 SHEETS

DRAWN MBB | CH'KD R.H.D. | APP'D | REF. 3/6608

4SL / 6608

ISSUE B

GSA

C & S Antennas Ltd, Knight Road, Rochester, Kent. ME2 2AX. England.
Tel: 0634 715544
International +44 634 715544
Facsimile: 0634 719742 Group 3
Telex: 965040
Cables: GSA ROCHESTER

ITEM	DESCRIPTION	MATERIAL			REMARKS	STOCK NO.		QTY.	DRG. No.
		TYPE	SPEC	SIZE		RAW MAT'L.	FINISHED		
1	EARTH CONNECTING STRAP	SOFT COPPER		1¼" x ⅛" x 4'-6" LG		E80		1	4/6314
2	EARTH ROD	COPPER BONDED STEEL		5/8" DIA x 1.2 M			Q79	1	
3	COUPLING	BRONZE		5/8"			Q82	1	
4	CONNECTOR CLAMP			FOR RECT. SECTION			Q89	1	
5	DRIVING STUD	STEEL		5/8" DIA			Q80	1	
6	NOT USED								
7	WASHER - PLAIN	GMS		5/8" I/D	USED ON LTS MAST		BK 16	1	
8	WASHER - PLAIN	GMS		3/4" I/D	USED ON HTS MAST		BK 14	1	
9									
0									
1									
2									
3	ALSO SUPPLY 1 COPY EACH OF 3/6608 & 4SL/6608								
4									
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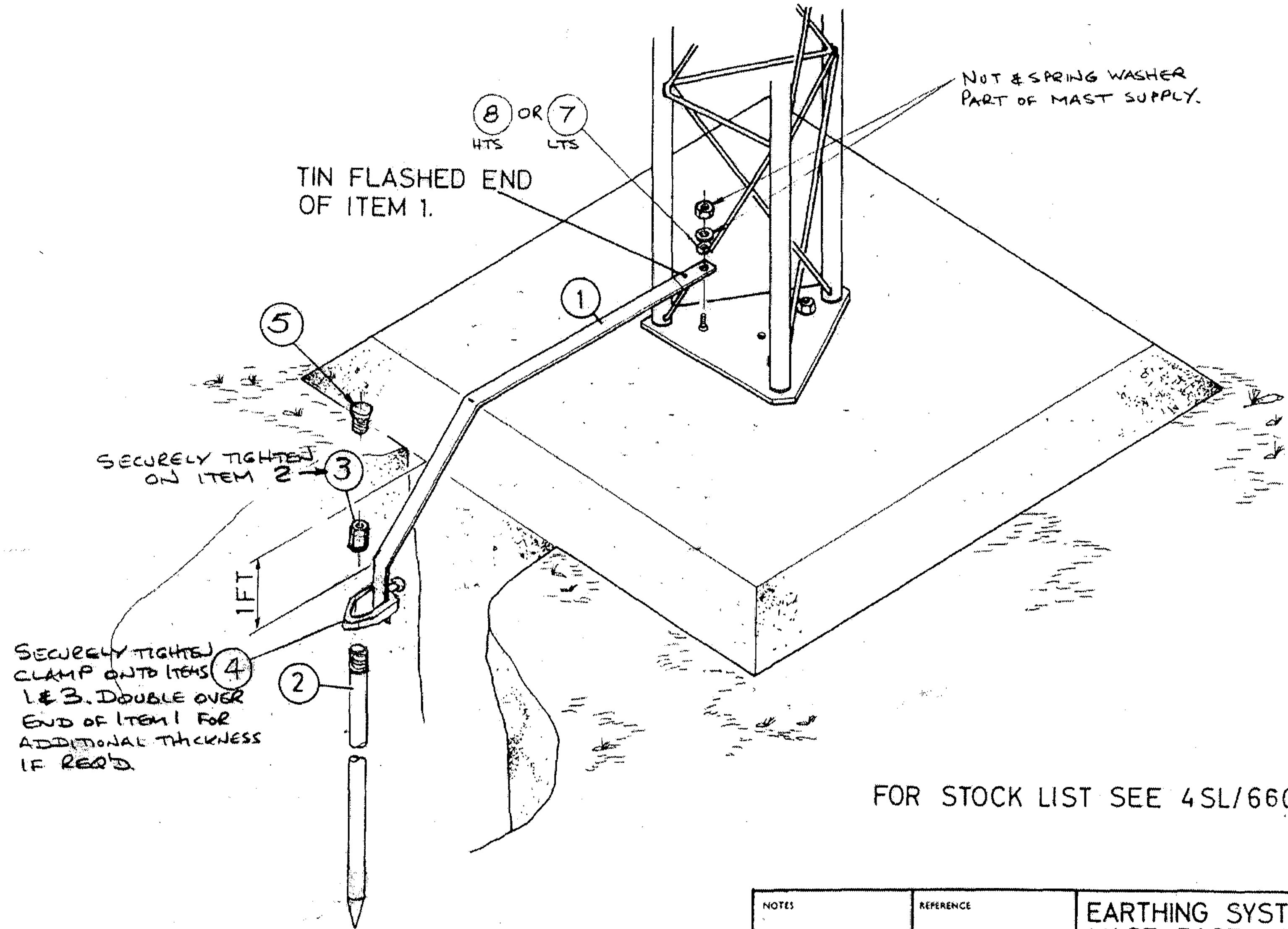
THIRD ANGLE PROJECTION



FOR STOCK LIST SEE 4SL/6608.

NOTE: ITEM 5 DRIVING CAP USED WHEN INSERTING EARTH ROD.
ITEM ① TO BENT TO SUIT ON SITE.

NOTES	REFERENCE	EARTHING SYSTEM FOR MAST BASE UNIT. (LTS/HTS)
		DRAWN 1/12/71
		CH'KD
		APP'D
		SCALE NTS · 3 / 6608 / · ISSUE 8

C & S Antennas Ltd.
Knight Road, Strood, Kent.

TITLE MAST SECTION Type - PLM

SHEET No. 1 OF 1 SHEETS

DRAWN AFJ | CH'KD [illegible] | APP'D [illegible] | REF 1/28974

4SL / 28974 | ISSUE 2

GSA

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Tel: 0634 715544 International: +44 634 715544
Facsimile: 0634 717742 Group 3
Telex: 96146 CSAG G
Cables: CSA ROCHESTER

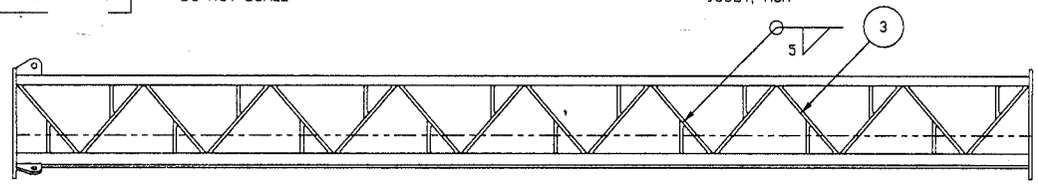
ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK NO. RAW MAT'L.	STOCK NO. FINISHED	QTY.	DRG. No.
1	END PLATE	M.S.	BS 4360 GR. 43C	416x480x12·5	(SHAPED)	SS206		2	4/34577
2	LEG	M.S. ANGLE	BS4360 GR. 43A.	50x50x8x3785	+1·5 −3	SS207		3	
3	BRACING-STR. L'G.	H.Y.ST.	BS4360 GR. 50C	ϕ12 x 362		SS208		48	4/34578
4	BRACING-STR. SHORT	H.Y.ST.	BS4360 GR. 50C	ϕ12x136		SS208		16	4/34579
5	LUG	M.S.	BS 4360 GR. 43C	64x10x95		SS209		3	4/34580
6	WELDING WIRE		BS2901 Pt. 1	ϕ1·2		E396		1·25kg.	
7									
8									
9									
0	NOTES								
1	1. MATERIAL FOR ALL ITEMS TO HAVE A CHARPY IMPACT VALUE AT 0°C OF NOT LESS THAN 27 J.								
2									
3									
4									
5									
6									
7	APPROX. WEIGHT OF SECTION = 100kg								
8	" PAINTING AREA = 2·5 m^2								
9									
0									

ISSUE 2 | 28974 1/

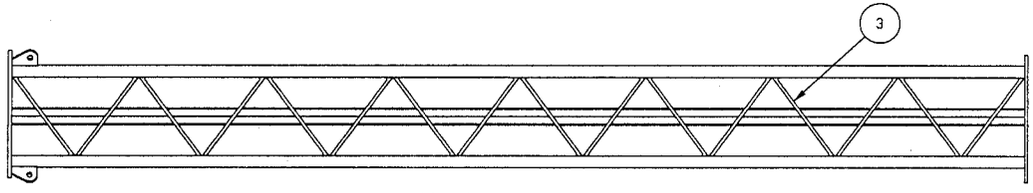
DO NOT SCALE

DOUBT, ASK

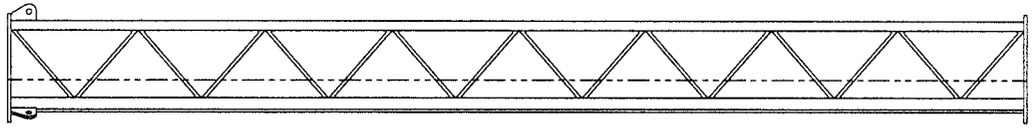
THIRD ANGLE PROJECTION



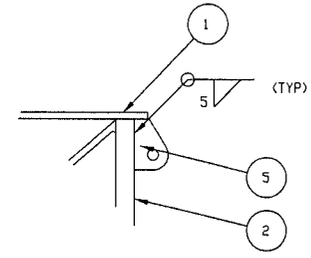
VIEW ON ARROW W

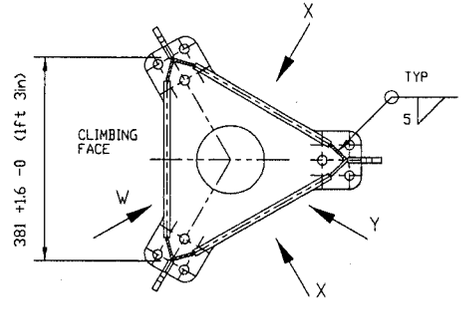


VIEW ON ARROW X
(2 PLACES)



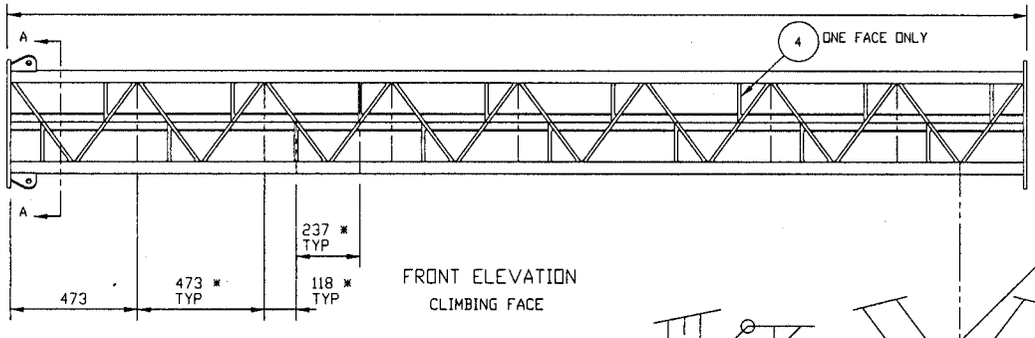
VIEW ON ARROW Y



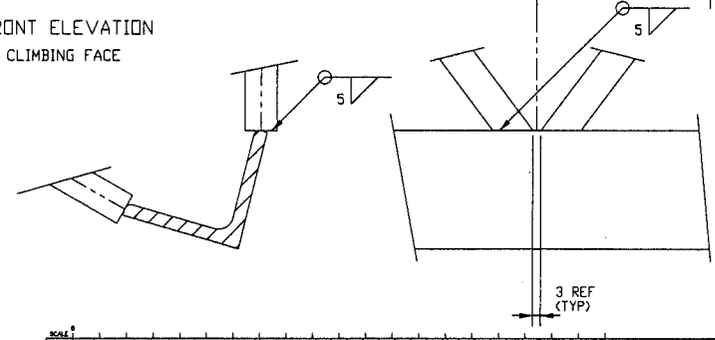


SECTION A-A
SCALE 1/5

3810 +1.5 -3 (12ft 6in)



FRONT ELEVATION
CLIMBING FACE



FABRICATION OF SECTION TO BE CARRIED OUT USING WELDING FIXTURE - TOOL No T1129

WELDING TO BE IN ACCORDANCE WITH BS5135. USING WELDING WIRE TO BS2901 PT 1
ALL WELDS TO BE 5mm FILLETS

FINISH HOT DIP GALVANISE TO BS729 WITH 915g/m² MIN AVE. COATING AFTER FABRICATION

END PLATES TO BE FLAT & PERPENDICULAR TO AXIS OF SECTION
AFTER FABRICATION & FREE FROM EXCESSIVE ZINC - IF NECESSARY
DRESS AFTER GALVANISING TO ENSURE FLATNESS (TO CONFORM
TO CLASS II OF DRG No 4/19282)

DIMENSIONS MARKED THUS * ARE NON-CUMULATIVE

WELDING SYMBOLS TO BS499 PT 1

THIS MAST SECTION MEETS THE REQUIREMENTS
OF RAFSEE/2812 ISS 1

FOR STOCKLIST SEE 4SL/28974

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILE NAME 28974_2

ORIGINAL FRAME SIZE: 841 X 594

ISSUE	CHANGE NOTE	No	DATE	APP'D
2	7805		JS	
1	MAT WAS 43A	11.83	11.83	RLT
-	1st PROV ISS	10.86	10.86	RLT

MATERIAL: SEE 4SL/28974
FINISH: SEE NOTES

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	-	±0.5mm ±3
ONE PLACE DECIMAL	-	±0.25mm
TWO PLACE DECIMAL	-	±0.15mm
HOLE CENTRES	-	±0.25mm
ANGLES	-	±1.0°

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TITLE: GA OF PLM MAST SECTION

DRAWN	DATE	SCALE
LRK	2.11.93	1:10
ENG APP'D: RLT	QA APP'D: RLT	REFERENCE

1/ 28974 ISSUE 2

ADS 664

GSA

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Fax: (0634) 719747 Telex: 96146 CSAG

STOCKLIST FOR:- HLS MAST SECTION (STOCK N° AR54)

DRAWN	CHKD	REFERENCE	SHT	ISSUE
AFD	TC	3391F	1 of 1 SHTS	5

APP'D [signature] DATE 23-9-91

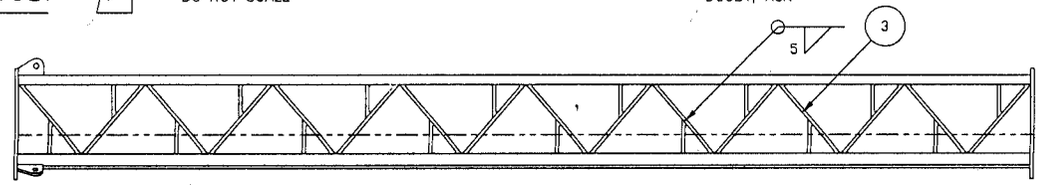
4SL/3391

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	END PLATE	M.S.	BS4360 GR.43A	12.5x416x480 SHAPED		SS 26		2	2/19315
2	LEG	M.S.	"	45x45x5/x3785m		SS 63		3	
3	BRACING-LONG	M.S.	"	ø12x374		SS 2		48	4/25845
4	BRACING-SHORT	M.S	"	ø12x140		SS 2		16	4/19317
5	LUG-GUY	M.S	"	10x63.5x95 SHAPED		SS 25		3	3394P
6									
7									
8									
9									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									

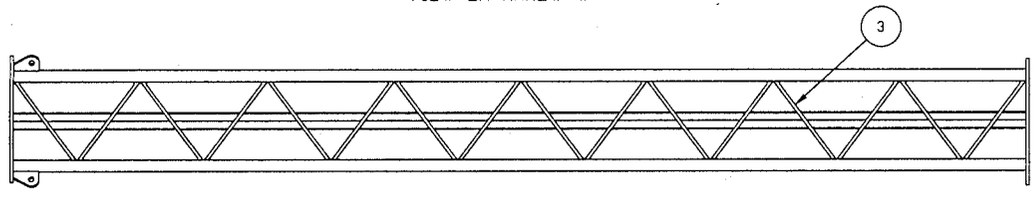
DO NOT SCALE

DOUBT, ASK

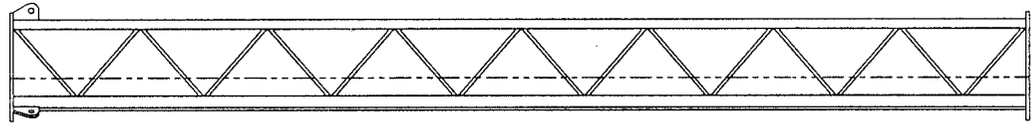
THIRD ANGLE PROJECTION



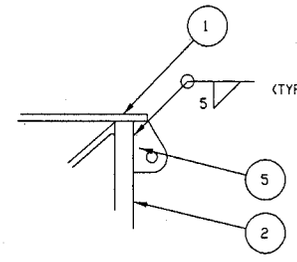
VIEW ON ARROW W

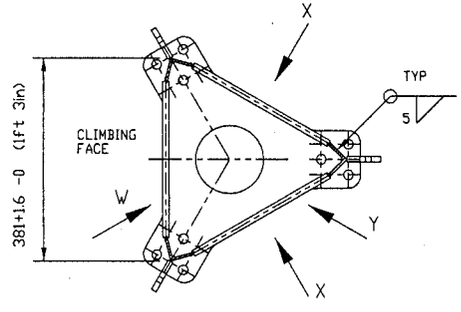


VIEW ON ARROW X
(2 PLACES)



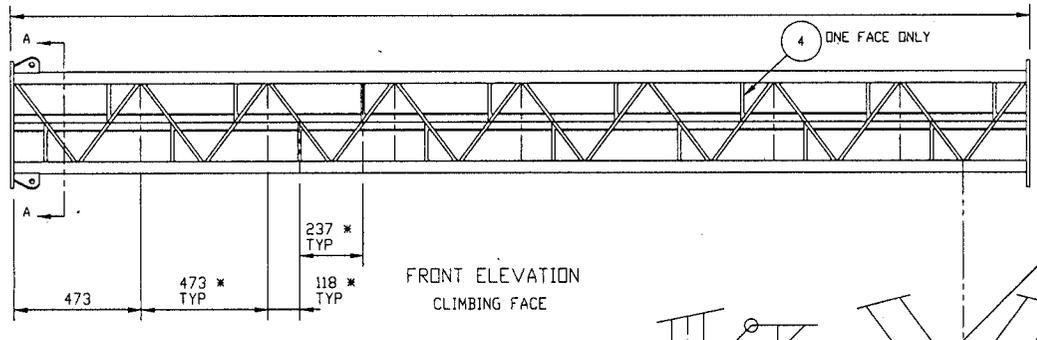
VIEW ON ARROW Y



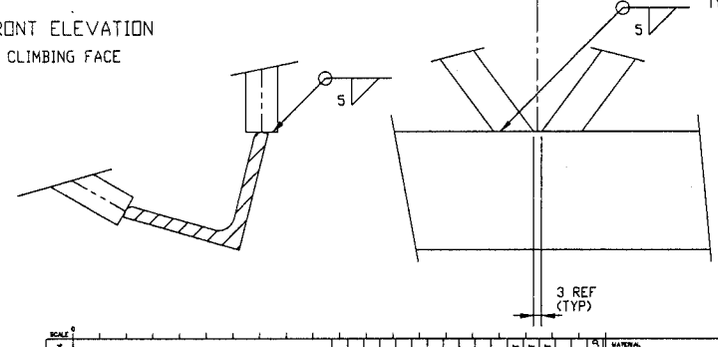


SECTION A-A
SCALE 1/5

3810 +1.5 -3 (12ft 6in)



FRONT ELEVATION
CLIMBING FACE



FABRICATION OF SECTION TO BE CARRIED OUT USING WELDING FIXTURE - TOOL No T1129

WELDING TO BE IN ACCORDANCE WITH BS5135.
ALL WELDS TO BE 5mm FILLETS

FINISH HOT DIP GALVANISE TO BS729 AFTER FABRICATION.
END PLATES TO BE FLAT & PERPENDICULAR TO AXIS OF SECTION AFTER FABRICATION & FREE FROM EXCESSIVE ZINC - IF NECESSARY DRESS AFTER GALVANISING TO ENSURE FLATNESS (TO CONFORM TO CLASS II OF DRG No 4/19282)

DIMENSIONS MARKED THUS * ARE NON-CUMULATIVE

FOR STOCKLIST SEE 4SL/3391

ISSUE	CHANGE NOTE No.	DATE	APP'D
5	7413	8.91	RLT
4	5857	10.93	RLT
3	3183	1.76	RLT
2	3146		
1	448		

ORIGINAL FRAME SIZE 801 X 554

MATERIAL: SEE 4SL/3391

FINISH: SEE NOTES

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	±0.5mm ±3
ONE PLACE DECIMAL	±0.25mm
TWO PLACE DECIMAL	±0.13mm
HOLE CENTRES	±0.05mm
ANGLES	±1°

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Fax: (01634) 715742

TITLE: GA OF HKS SECTION

DRAWN	DATE	SCALE
LRK	23-9-91	1:10
CHG. APP'D	QA APP'D	REFERENCE
RLT	RLT	AR54

1/ 3391F ISSUE 5

GENERATED USING AutoCAD 2000/AM04
STORED UNDER FILE NAME 3391_5

ADS 664

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Fax: (0634) 15742 Telex: 96146 CSAG

STOCKLIST FOR:- INSULATOR TOP UNIT.

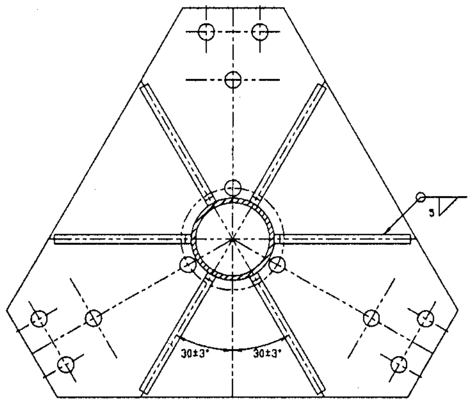
DRAWN: APD | CH'KD: TC | APP'D: [illegible] | DATE: 23.9.11 | REFERENCE: 0/33450 | ISSUE: 1 | SHT 1 OF SHTS

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	END PLATE	M.S.	BS 4360 GR. 43A	10 X 418 x 484 SHAPED		SS 25		1	
2	TUBE	M.S.	" GR 43C	ϕ88.9 x 5 WALL x 100		SS 84		1	
3	WEB	M.S.	" GR 43A	10 x 94 x 146 SHAPED		SS 25		6	
4	LOWER PLATE	M.S.	" "	10 x ϕ230		SS 25		1	
5									
6									
7									
8									
9									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									

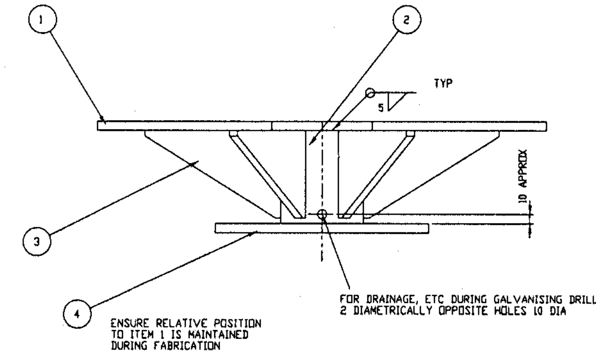
NOT SCALE

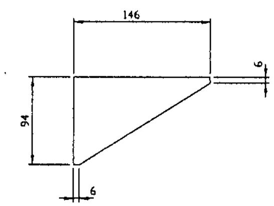
IF IN DOUBT, ASK

THIRD ANGLE PROJECTION

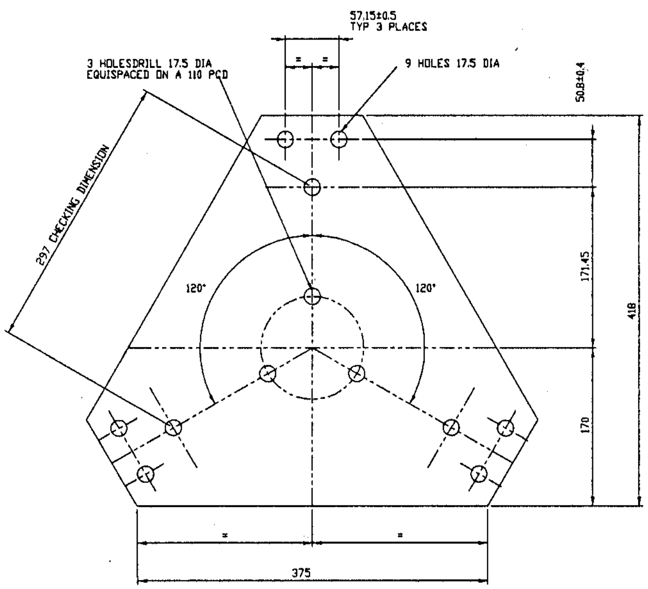


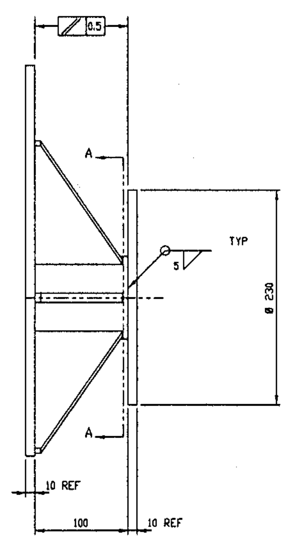
SECTION A-A

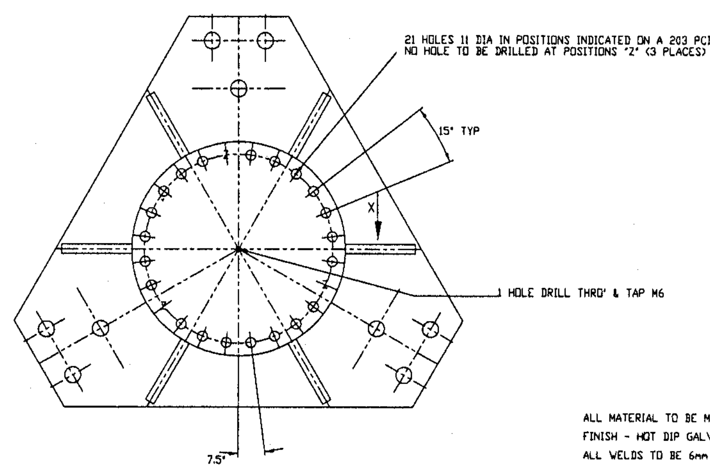




VIEW ON ARROW 'X'
(VIEW OF WEB)







ALL MATERIAL TO BE MS TO BS4360GRADE 43A
FINISH - HOT DIP GALVANISE TO BS 729
ALL WELDS TO BE 6mm FILLETS
TAPPED HOLE TO BE CLEARED AFTER GALVANISING & WELL OILED

FOR STOCKLIST SEE 4SL/33450

MATERIAL	SEE 4SL33450
FINISH	SEE NOTE
ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED	TOLERANCES UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS - NO PLACE DECIMAL - ; ONE PLACE DECIMAL - ±0.25mm; TWO PLACE DECIMAL - ±0.10mm; HOLE CENTRES - ±0.38mm; ANGLES - ±1/2 deg
TITLE	INSULATOR TOP UNIT WB SERIES
DRAWN	LRK
DATE	23.9.91
SCALE	1:2
ENG APPD	RLT
QA APPD	RLT
REFERENCE	WB SERIES
DRAWING NO.	0/ 33450
ISSUE	1

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Fax: (0634) 716740 Telex: 96144 CSAG

STOCKLIST FOR– UPPER ANTENNA WIRE

DRAWN	CHK'D	DATE	REFERENCE	SHT	OF SHTS
[illegible]	[illegible]	26-1-94	3/34630	1	1

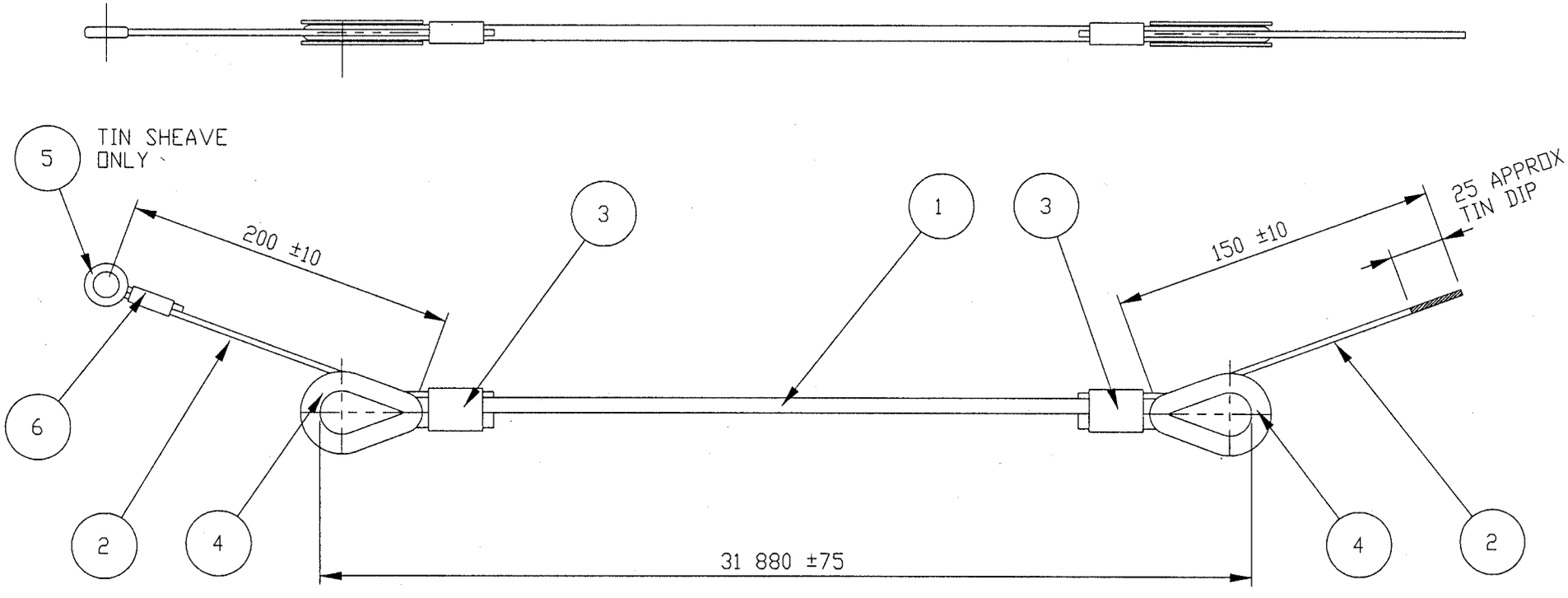
APP'D			ISSUE
[illegible]		4SL/34630	1

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	WIRE	HDCC	BS125	7/2·3		E 397		32m	
2	TAIL	HDCC	BS125	7/0·914 (7/·036)		ES.		0·35m	
3	FERRULE	CU		Nº8 INTAL.		AL 146		2	
4	THIMBLE	BLACK NYLON		F1182.		BH 59		2	
5	SHEAVE	BRASS.			DETAIL 1.		AL 64	1	4/28198
6	FERRULE	CU		Nº3 TALURIT.		AL 55		1	
7									
8									
9									
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									

DO NOT SCALE

IF IN DOUBT, ASK

THIRD ANGLE PROJECTION



FOR STOCKLIST SEE 4SL/34630

SCALE 0

ORIGINAL FRAME SIZE 284 X 407

ISSUE	CHANGE NOTE No	DATE	APP'D
1	FIRST	1.94	RLT

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILENAME
34630_1

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS :-

NO PLACE DECIMAL	±0.5mm
1 PLACE DECIMAL	±0.25mm
2 PLACE DECIMAL	±0.15mm
HOLE CENTRES	±0.25mm
ANGLES	±1.0°

ALL DIMENSIONS IN MILLIMETRES (mm)
UNLESS OTHERWISE SPECIFIED

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MATERIAL

FINISH

TITLE: UPPER ANTENNA WIRE

DRAWN	DATE	REFERENCE	SCALE
LRK	25.1.94	4SL/34630	1:2
ENG. APP'D: RLT	QA APP'D: RLT	3/ 34630	ISSUE: 1

ADS 664

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STOCKLIST FOR:- LOWER ATTENUATOR WIRE WB SERIES/BCM SERIES.

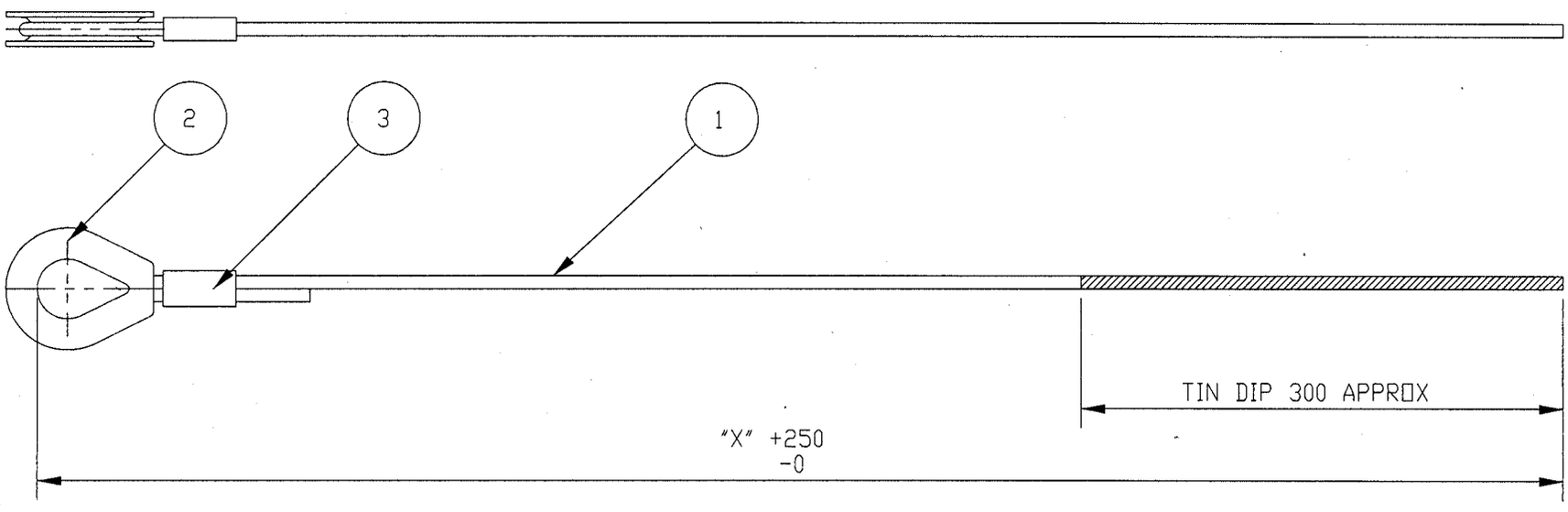
DRAWN: AC
CH'KD: TC
APP'D:
DATE: 23-9-91
REFERENCE: 3/33460
ISSUE: 1
SHT 1 OF SHTS

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	WIRE	HDCC		7/0.914(7/.036)		E 5		SEE BELOW	
2	THIMBLE	BLACK NYLON		F1288			BN 19	1	
3	FERRULE	CU		N°3 TALURIT		AL 55		1	
4									
5									
6									
7									
8									
9									
0									
1									
2									
3	ITEM 1, MATERIAL ALLOCATION :-								
4	FOR WB230, QTY. TO BE 32.6m								
5	FOR WB330, QTY. TO BE 21.6m								
6	FOR WB4530, QTY. TO BE 14.6m								
7	FOR BCM9, QTY. TO BE 13.55m								
8	FOR BCM1, QTY. TO BE 11.35m								
9	FOR BCM7, QTY. TO BE 12.55m								
0									

DO NOT SCALE

IF IN DOUBT, ASK

THIRD ANGLE PROJECTION



DETAIL No	DIM. X
1	32 500
2	21 500
3	14 500
4	13 450
5	11 250
6	12 450

FOR STOCKLIST SEE 4SL/33460

SCALE 0

ORIGINAL FRAME SIZE 284 X 407

ISSUE	CHANGE NOTE No	DATE	APP'D
1	FIRST	9.91	RLT

GENERATED USING
AutoCAD 2000/AMD4
STORED UNDER FILENAME
44360_1

TOLERANCES
UNLESS OTHERWISE STATED
TOLERANCES TO BE AS FOLLOWS :-

NO PLACE DECIMAL	-	±0.5mm
1 PLACE DECIMAL	-	±0.25mm
2 PLACE DECIMAL	-	±0.15mm
HOLE CENTRES	-	±0.25mm
ANGLES	-	±1.0°

ALL DIMENSIONS IN MILLIMETRES (mm)
UNLESS OTHERWISE SPECIFIED

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Fax: (01634) 715742

MATERIAL	FINISH
SEE 4SL/33460	

TITLE: LOWER ANTENNA WIRE

DRAWN	DATE	REFERENCE	SCALE
LRK	23.9.91	WB & BCM SERIES	NTS
ENG. APP'D: RLT	QA APP'D: RLT	3/ 33460	ISSUE: 1

ADS 664

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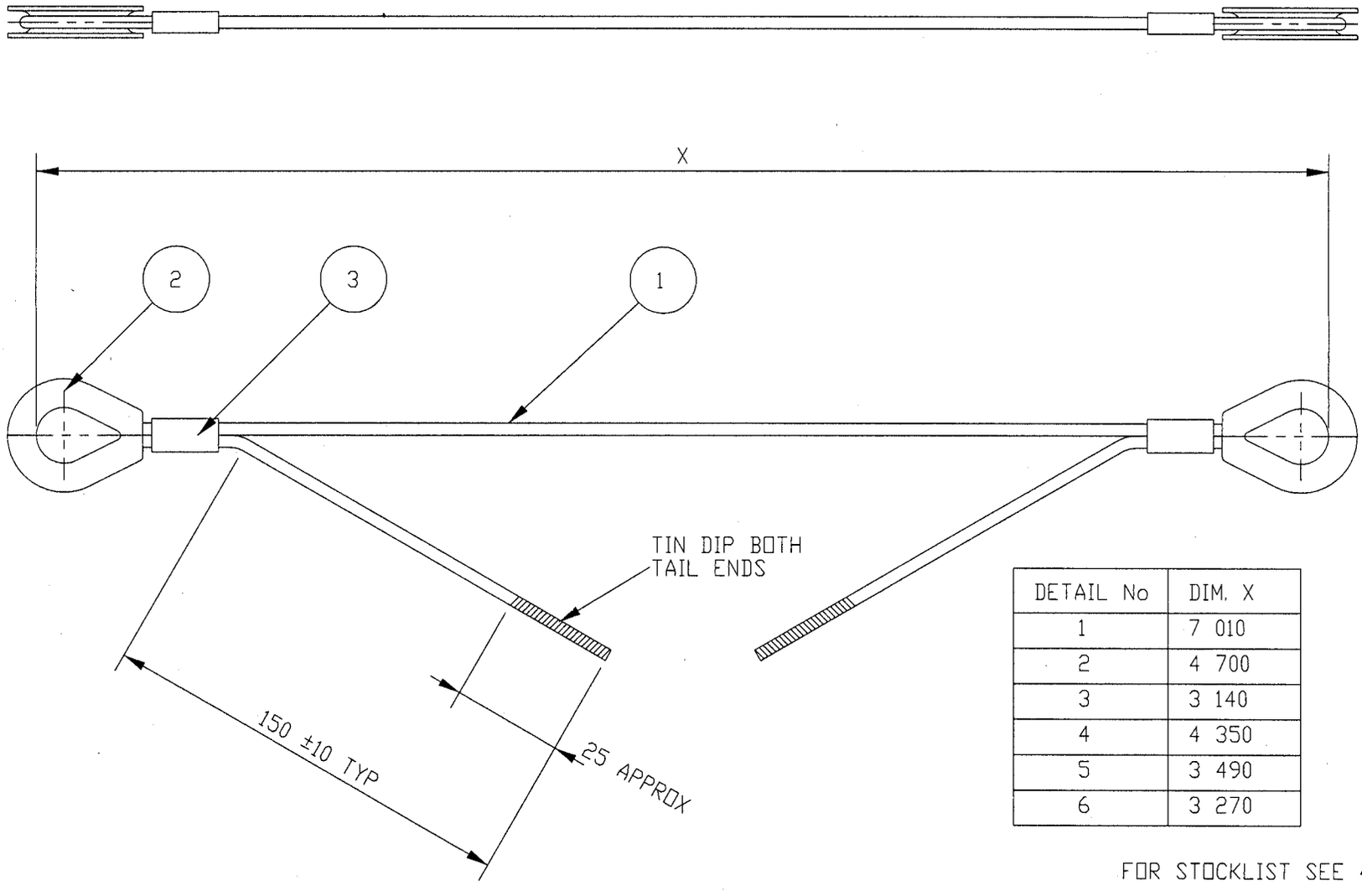
Telephone (0634) 715544
International + 44 634 715544
Fax (0634) 715742 Telex 96146 CSAG

STOCKLIST FOR~ SPACER WIRE WB SERIES/BCM SERIES

DRAWN: AFS
APP'D: [illegible]
CH'KD: TC
DATE: 23-9-91
REFERENCE: 3/33461
SHT 1 OF 1 SHTS
ISSUE: 1

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	WIRE	HDCC		7/0.914(7/.036")		E 5		SEE BELOW	
2	THIMBLE	BLACK NYLON		F1288			BN 19	2	
3	FERRULE	C.U.		N°3 TALURIT		AL 55		2	
4									
5									
6									
7									
8									
9									
0									
1									
2									
3	ITEM 1, MATERIAL ALLOCATION :-								
4	FOR WB230, QTY. TO BE		7.43	m					
5	FOR WB330, QTY. TO BE		5.12	m					
6	FOR WB4530, QTY. TO BE		3.56	m					
7	FOR BCM9, QTY. TO BE		4.77	m					
8	FOR BCM1, QTY. TO BE		3.91	m					
9	FOR BCM7, QTY. TO BE		3.69	m					
0									

DO NOT SCALE | IF IN DOUBT, ASK | THIRD ANGLE PROJECTION



DETAIL No	DIM. X
1	7 010
2	4 700
3	3 140
4	4 350
5	3 490
6	3 270

FOR STOCKLIST SEE 4SL/33461

SCALE 0

ORIGINAL FRAME SIZE 284 X 407

ISSUE	CHANGE NOTE No	DATE	APP'D
1	FIRST	9.91	RLT

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILENAME
33461_1

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS :–

NO PLACE DECIMAL	–	~~±0.5mm~~ ±10
1 PLACE DECIMAL	–	±0.25mm
2 PLACE DECIMAL	–	±0.15mm
HOLE CENTRES	–	±0.25mm
ANGLES	–	±1.0°

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE SPECIFIED

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Fax: (01634) 715742

MATERIAL: SEE 4SL/33461		FINISH:	
TITLE: SPACER WIRE			
DRAWN: LRK	DATE: 23.9.91	REFERENCE: WB & BCM SERIES	SCALE: NTS
ENG. APP'D: RLT	QA APP'D: RLT	3/ 33461	ISSUE: 1

TITLE: 1 5/8 E.I.A. TO OPEN WIRE ADAPTOR ASSY.

SHEET No. 1 OF 1 SHEETS

DRAWN BSH (24-3-71) | CHK'D JWM | APP'D [illegible] | REF 4/4872

4SL/4873

ISSUE 4

C & S Antennas Ltd.

ITEM	DESCRIPTION	MATERIAL	STOCK SIZE	STOCK No.	QTY.	REMARKS	DRG. No.
1	1 5/8" E.I.A. SOCKET ADAPTOR ASSY.		SEE 4EL/5453	AR.64	1		4/5453
2	SEALING COVER	BLACK POLYTHENE	2 3/4" DIA. x 1 1/8" LG.	A172	1		4/18659
3							
4	'O' RING	NITRILE	2001354460	M65	1	DOWTY	
5	PLAIN WASHER	ST. ST.	1/4" I/DIA.	BK59.	3		
6	HEX. HD. FULL NUT	" "	1/4" U.N.F.	BH61	2		
7	SILICONE RUBBER	PLAST 2000	158 004 01 (20 cc)		1	KABELMETAL	
8	PROTECTIVE CAP	POLYTH.		AI76	1		3/19232
9	SCREW. Hx. HD.	ST. ST.	5/16" BSW x 1 1/2"	BG21	4		
10	NUT - Hx. FULL	ST. ST.	5/16" BSW	BJ47	4		
11	WASHER - PLAIN	ST. ST.	5/16" I/D	BK50	4		
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
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6							
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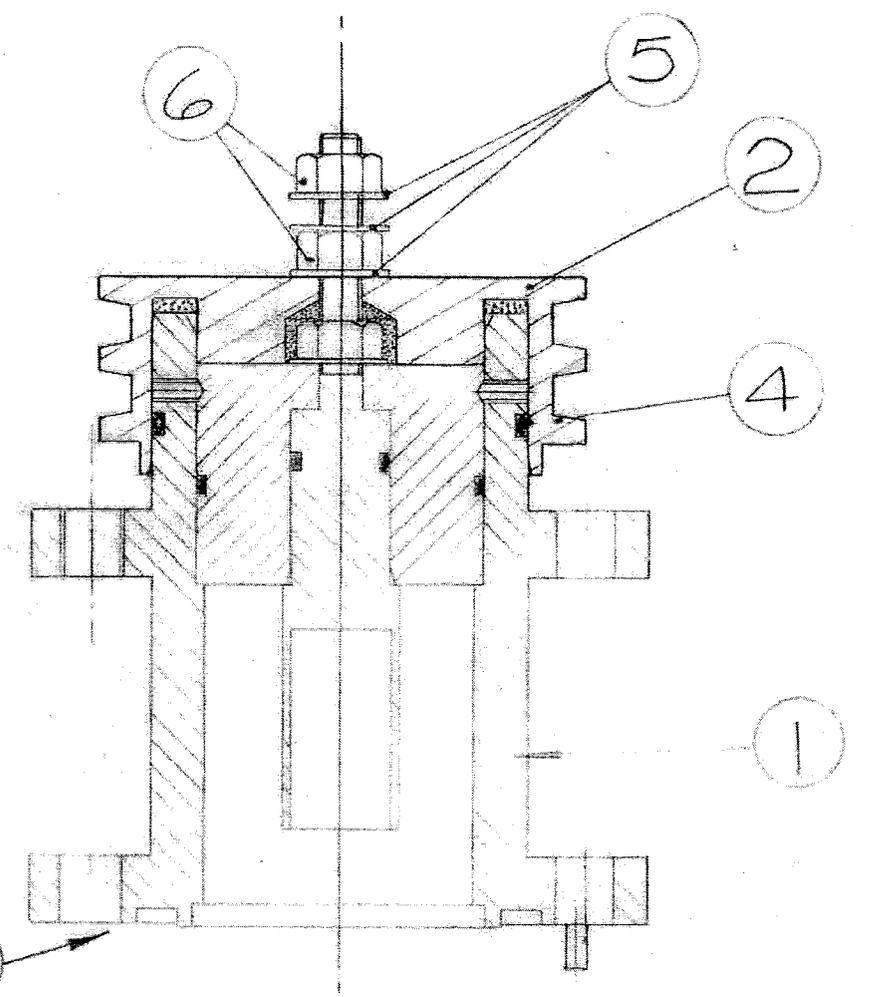
9							
0							

F.T. 6.76

THIRD ANGLE PROJECTION



FITTED BUT NOT SHOWN.

8 9 10 11

THE INTERNAL SURFACES, THREAD, OF ITEM 2 AND CAVITIES SHOWN THUS :::: TO BE COATED OR FILLED WITH SILICONE RUBBER (ITEM 7).

ISSUE 1 — 6.3.71

ISSUE 2 — SEE CH NOTE 9713 79 — 26/7/72

ISSUE 3 — SEE CH NOTE 2724 — 6/5/75

ISSUE 4 — SEE CH NOTE 4491 — 9/9/81

NOTES
FOR STOCKLIST, SEE 4S/4873

REFERENCE

15/8" E.I.R. TO OPEN WIRE SOCKET ADAPTOR ASSEMBLY.

DRAWN D.E.P. 1/2/70
CH'KD JLW
APP'D EDT
SCALE FULL SIZE

C & S Antennas Ltd.
Wentworth House, Eastern Avenue, Ilford, Essex.
Tel: 01-554 0102 Telex: 25850

4 / 4873 ISSUE 4

E.T:6.70

ADS 664

1st Iss 6/91. R46

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STOCKLIST FOR:- INSTALLATION SPARES. (WB SERIES)

APP'D	
DRAWN	AJD
DATE	29/6/91
CH'KD	TC
REFERENCE	4SL/33374
ISSUE	1
SHT 1 OF 2 SHTS	

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	BOLT - Hx.Hd. X0X	G.M.S		M16 x 45			BE 94	15	
2	WASHER - SPRING	G.Sp.S		M16/5/8"			BK 141	15	
3	WASHER - PLAIN	G.M.S		M16/5/8"			BK 16	1	
4	NUT - HEX. FULL	G.M.S		M10			BJ 76	1	
5	WASHER - PLAIN	G.M.S		M10			BK 85	1	
6	SCREW - PAN HD.	ST.ST.		M6 x 16			BH 74	1	
7	SHACKLE - DEE	ST.ST.		6 x 6 (1/4" x 1/4")			BP 84	1	
8	THIMBLE	BLACK NYLON		PATT. N° F974			BN 58	1	
9	CLAMP - LINE	DNP BRASS		B 8020			P 38	1	
10	'T' CONNECTOR	TINNED BRASS		HD10TM			P	1	4/33523
11	TAP - LINE	TINNED BRASS		HD10 (OR EQUIV.)			P 43	2	
12	BOLT - Hx Hd.	ST.ST		M6 x 30			BH 75	1	
13	SHACKLE - BOW	ST.ST		6 x 6 (1/4" x 1/4")			BP 150N	1	
14	NUT - Hx. SELFLOCK	ST.ST.		M6			BJ 73	1	
15	WASHER - PLAIN	ST.ST		M6			BK 82	2	
16	SCREW - Hx. Hd.	ST.ST.		M10 x 30				3	
17	NUT - Hx. FULL	ST.ST		M10			BJ 84	3	
18	WASHER - PLAIN	ST.ST.		M10			BK 91	2	
19	SCREW - Hx. Hd.	ST.ST.		M6 x 12			BH 70	2	
20	PIN - COTTER. (SPLIT)	ST.ST.		3/32 DIA. x 5/8"	FOR 0.5T PARAFIL TERMNS			5	

MARKED

ADS 664

1st Iss 4/91. RJG

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Fax (0634) 715742 Telex 96145 CSAG

APP'D RJG
DRAWN AJD
DATE 29/9/91
CH'KD TC
REFERENCE 4SL/33374
ISSUE 1
SHT 1 OF 2 SHTS

STOCKLIST FOR- INSTALLATION SPARES. (WB SERIES)

MASTER

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	BOLT - Hx. Hd. X0X	G.M.S		M16 x 45			BE 94	15	
2	WASHER - SPRING	G.S.S.		M16/5/8"			BK 141	15	
3	WASHER - PLAIN	G.M.S.		M16/5/8"			BK 16	1	
4	NUT - HEX. FULL	G.M.S.		M10			BJ 76	1	
5	WASHER - PLAIN	G.M.S.		M10			BK 85	1	
6	SCREW - PAN HD.	ST.ST.		M6 x 16			BH 74	1	
7	SHACKLE - DEE	ST. ST.		6 x 6 (1/4" x 1/4")			BP 84	1	
8	THIMBLE	BLACK NYLON		PATT. N° F974			BN 58	1	
9	CLAMP - LINE	DNP BRASS		B 8020			P 38	1	
10	'T' CONNECTOR	TINNED BRASS		HD10TM			P	1	4/33523
11	TAP - LINE	TINNED BRASS		HD10 (OR EQUIV.)			P 43	2	
12	BOLT - Hx Hd.	ST. ST		M6 x 30			BH 75	1	
13	SHACKLE - BOW	ST. ST		6 x 6 (1/4" x 1/4")			BP 150N	1	
14	NUT - Hx. SELFLOCK	ST. ST.		M6			BJ 73	1	
15	WASHER - PLAIN	ST. ST.		M6			BK 82	2	
16	SCREW - Hx. Hd.	ST. ST.		M10 x 30				3	
17	NUT - Hx. FULL	ST. ST.		M10			BJ 84	3	
18	WASHER - PLAIN	ST. ST.		M10			BK 91	2	
19	SCREW - Hx. Hd.	ST. ST.		M6 x 12			BH 70	2	
20	PIN - COTTER. (SPLIT)	ST. ST.		3/32" DIA. x 5/8"	FOR 0.5T PARAFIL TERMNS			5	

ADS 664

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GSA

STOCKLIST FOR:- INSTALLATION SPARES (WB SERIES)

DRAWN: AFD
APP'D: [illegible]
CH'KD: TC
DATE: 29/6/91
REFERENCE: 4SL/33374
ISSUE: 1
SHT 2 OF 2 SHTS

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
21	PIN - COTTER (SPLIT)	ST. ST.		1/8" DIA. X 7/8"	FOR 3-5T PARALL TERMS			5	
2									
3									
4									
5									
6									
7									
8									
9									
0									
1									
2	SUPPLY ALSO 1 COPY OF THIS STOCKLIST.								
3									
4									
5									
6									
7									
8									
9									
0									

ADS 664

1st. Iss. 7/91
Iss. 2 2694 1/93

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International + 44 634 715544
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STOCKLIST FOR:- ERECTION EQUIPMENT FOR WB SERIES. PRODUCT CODE - WBEE

DRAWN: AFS
CH'KD: TC
APP'D:
DATE: 4-7-91
REFERENCE: 4SL/33451
SHT 1 OF 1 SHTS
ISSUE 2

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	POLE - ERECTION DERRICK			4SL/4942 SHT. 2			Q 13	1	3/4942
2	SHACKLE - DEE	GMS		1/2" x 1/2"			BP 7	6	
3	BLOCK - PULLEY. SINGLE SHEAVE	G.M.C.I.	SOE	4" SHEAVE FOR Ø10 NELSON			N 44	1	
4	ROPE - HAULING	NELSON		Ø10 x 84m ±2m	HEAT SEAL ENDS.	BN 88		1	
5	BLOCK - PULLEY. SINGLE SNATCH	GMCI	SOE	4" SHEAVE FOR Ø10 NELSON			N 45	1	
6	ROPE - HOLDING OFF	NELSON		Ø8 x 45m ±2m	HEAT SEAL ENDS	BN 87		1	
7	STAY - INSTALLATION TEMPORARY.			4SL/20022	DET'L 2			3	4/20022
8	GRIP - BULLDOG	HDG & ELECT. G.M.ST.		Ø6 (1/4")			BL 2	12	
9	THIMBLE	GMS			DET'L 1		BN 72	3	4/7397
10	STAY - DOUBLE. DERRICK POLE			4SL/21572	DET'L 2			1	4/21572
11	NOT USED.								
12	KIT - TOOL			4SL/33452			BP 176	1	4SL/33452
13	ERECTION INSTRUCTIONS				LATEST ISSUE			1	EI-1008
14	ERECTION INSTRUCTION				LATEST ISSUE			1	EI-1157
5									
6									
7									
8									
9	SUPPLY ALSO 1 COPY OF THIS STOCKLIST & 4PS/29105								
0									

MASTER

ADS 664

1st 1&S 7/91 RWS

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Fax: (0634) 715742 Telex: 96146 CSAG

STOCKLIST FOR:- TOOL KIT.
SUITABLE FOR WBEE, LTSEE, BCM, ETC.

APP'D BWB
DRAWN AFD
DATE 4-7-91
CH'KD TC
REFERENCE 4SL/33452
ISSUE 1
SHT 1 OF 1 SHTS

MASTER

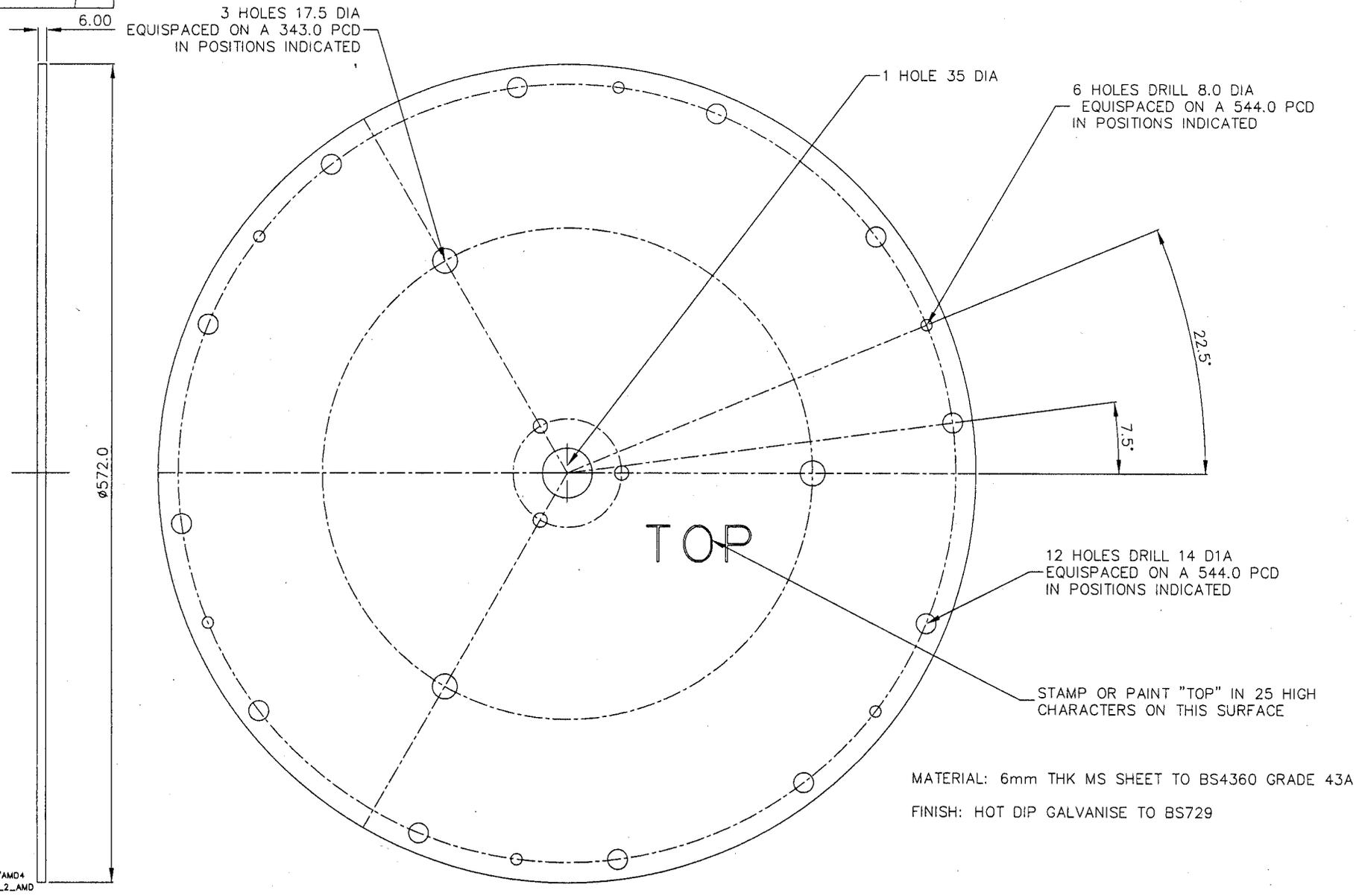
ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	SCREWDRIVER.	FLAT HEAD		STUBBY, 30mm			BP 110	1	
2	SPANNER-BOX. C/W BAR	ST.		8 A/F x 10 A/F			BP 177	1	
3	SPANNER-D.O.E	ST.		8 A/F x 10 A/F			BP 118	2	
4	SPANNER-DOE	ST		13 A/F x 17 A/F			BP 178	2	
5	SPANNER-DOE	ST.		1/4" BS x 5/16 BS (3/16 x 1/4 W)			BP 49	2	
6	SPANNER- CRANKED PODGER	ST.	OPEN ENDED	24 A/F			BP 179	2	
7	SPANNER-COMBI	ST.		24 A/F			BP 131	2	
8	SPANNER-ADJUST.			50 JAW MAX. 200 NOMINAL LENGTH			BP 42	1	
9	SPANNER-DOE	ST.		17 A/F x 19 A/F			BP 117	2	
0									
1									
2									
3									
4									
5									
6									
7									
8	SUPPLY ALSO	1 COPY OF		THIS STOCKLIST.					
9									
0									

ISSUE	36205	2

DO NOT SCALE

IF IN DOUBT, ASK

THIRD ANGLE PROJECTION



MATERIAL: 6mm THK MS SHEET TO BS4360 GRADE 43A

FINISH: HOT DIP GALVANISE TO BS729

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILE NAME 36205_2_AMD

SCALE 0

ORIGINAL FRAME SIZE 390 X 541

ISSUE	CHANGE NOTE No	DATE	APP'D
2	9338	2.02	JG
1	FIRST	1.02	JG

MATERIAL: SEE NOTE

FINISH: SEE NOTE

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED
TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	~~±0.5mm~~ ±3
ONE PLACE DECIMAL	~~±0.25mm~~ ±1.5
TWO PLACE DECIMAL	~~±0.15mm~~
HOLE CENTRES	~~±0.25mm~~
ANGLES	~~±1.0°~~ ±1°

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TITLE: MAST HEADCAP WB SERIES WITH SINGLE NEON LIGHT

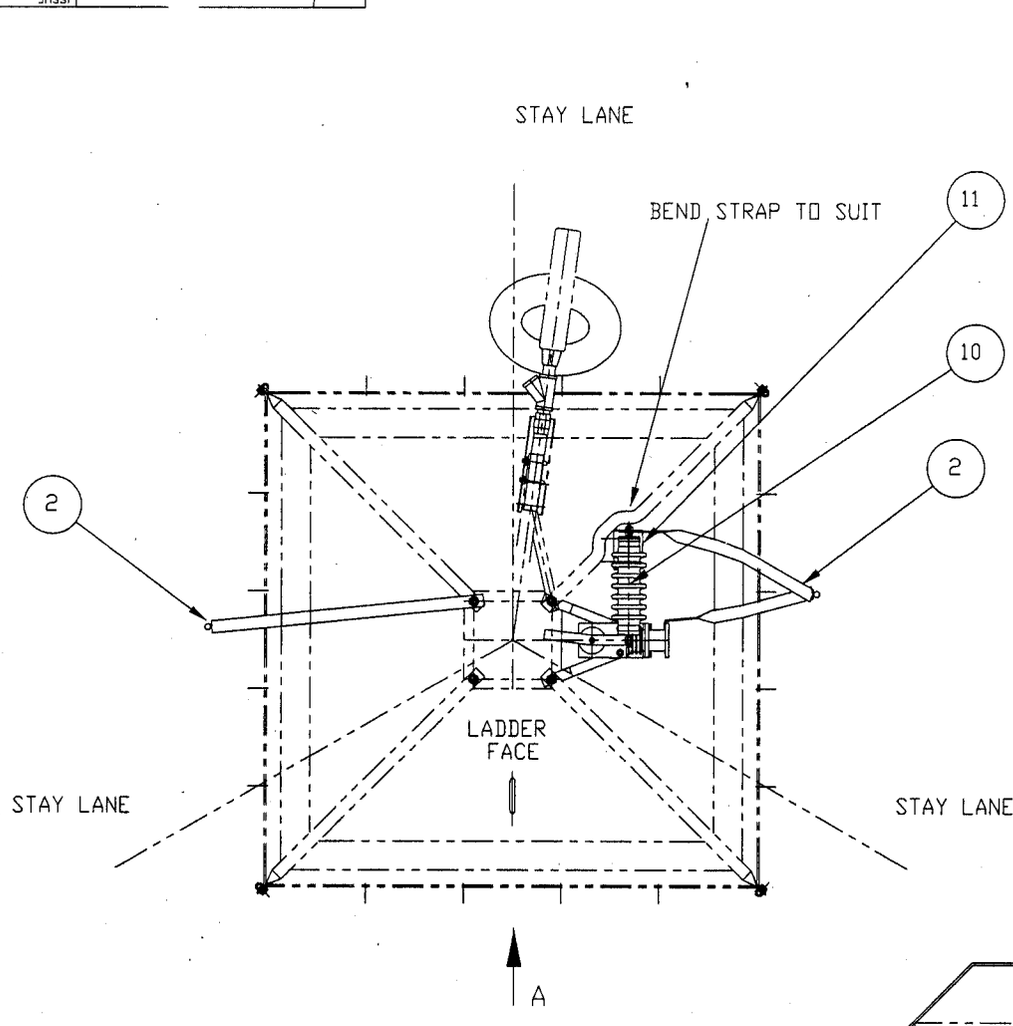
DRAWN	DATE	SCALE
LRK	12.11.01	1:2
ENG. APP'D	QA APP'D	REFERENCE
JG	JG	WB SERIES

2/ 36205 ISSUE 2

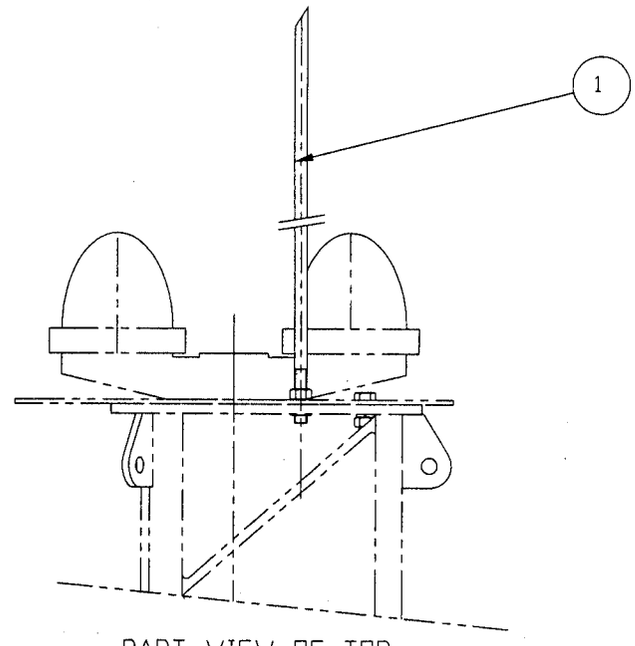
DO NOT SCALE

IF IN DOUBT, ASK

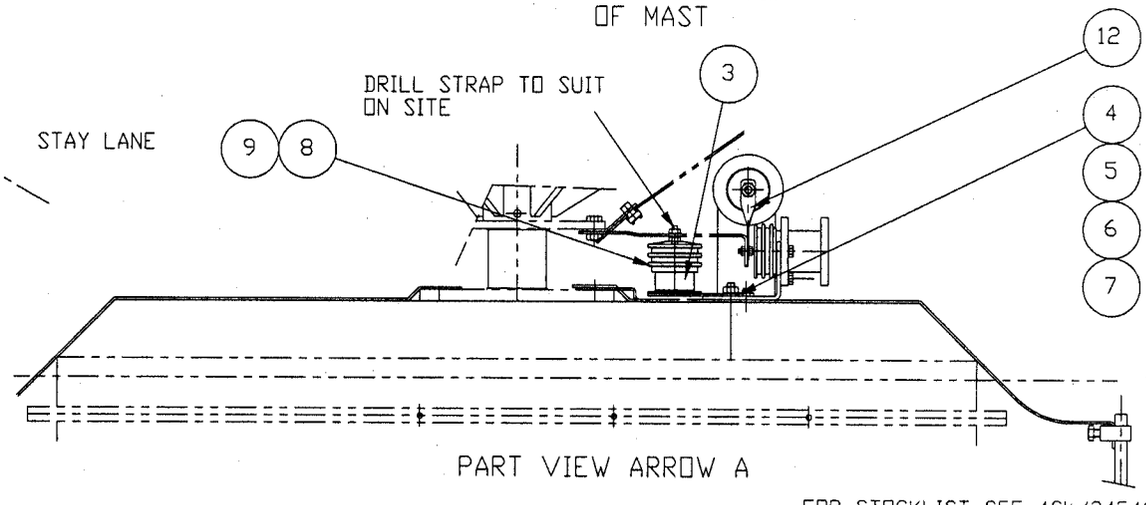
THIRD ANGLE PROJECTION



PLAN VIEW



PART VIEW OF TOP OF MAST



PART VIEW ARROW A

GENERATED USING AutoCAD 2000/AMD4
STORED UNDER FILE NAME 34548_2

FOR STOCKLIST SEE 4SL/34548

SCALE 0

ORIGINAL FRAME SIZE 390 X 541

ISSUE	CHANGE NOTE No	DATE	APP.D
2	7855	2.94	RLT
1	FIRST	2.94	RLT

MATERIAL

FINISH

ALL DIMENSIONS IN MILLIMETRES (mm) UNLESS OTHERWISE STATED

TOLERANCES
UNLESS OTHERWISE STATED TOLERANCES TO BE AS FOLLOWS:-

NO PLACE DECIMAL	±0.5mm
ONE PLACE DECIMAL	±0.25mm
TWO PLACE DECIMAL	±0.15mm
HOLE CENTRES	±0.25mm
ANGLES	±1.0°

CSA Wireless
A TruePoint Limited Company

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TITLE
EMP & LIGHTNING PROTECTION EQUIPMENT WB230 /20PLM

DRAWN	DATE	SCALE
LRK	18.2.94	1:10 & 1:5
ENG. APP'D	QA APP'D	REFERENCE
RLT	RLT	4SL/34615

2/ 34548 ISSUE 2

ADS 664

ISS.2 C/J 7855. 2/94 BAE

CSA Limited, Knight Road, Rochester, Kent ME2 2AX, England. Telephone: (0634) 715541 International: +44 634 715544 Fax: (0634) 715742 Telex: 96146 CSAG

STOCKLIST FOR:- EMP # LIGHTNING PROTECTION EQUIPMENT. WB230/20 PLM

DRAWN	APP'D	CH'KD	DATE	REFERENCE	SHT	ISSUE
APD		EAS	9-11-93	2/34548	1 OF SHTS	2

ITEM	DESCRIPTION	MATERIAL TYPE	MATERIAL SPEC	MATERIAL SIZE	REMARKS	STOCK No RAW MATL	STOCK No FINISHED	QTY	DRG No
1	LIGHTNING SPIKE	M.ST.		4SL/22890 x 1.5m	HEAVY DUTY GALV. 915g/sm			1	4/22890
2	MAST BASE EARTHING	EKA		4SL/6608			EKA	2	3/6608
3	LIGHTNING ARRESTOR	1903 SERIES.		MODEL No 1903-26	JOSLYN		AR 103	1	
4	MOUNTING PLATE	M.ST.	BS4360 GR. 43A	3x90x125	HEAVY DUTY GALV. 915g/sm	SS 91		1	3/34607
5	SCREW - CSK. HD.	ST.ST. Z&P		M4 x 10			BH 142	6	
6	NUT - Hx. FULL.	ST. ST Z&P		M4			BJ 81	6	
7	WASHER - PLAIN	ST. ST. Z&P		M4			CC 37	6	
8	COVER	BLACK POLYTHENE		ϕ70x40				1	4/34608
9	SEALANT						A 79	2	
10	RESISTOR - STATIC DRAIN			TYPE SP-003C	RACAL-DECCA (CANADA)		BO 267	1	
11	STRAP - RESISTOR SUPPORT	M.ST.		3x75x268	HEAVY DUTY GALV. 915g/sm	SS 91		1	4/34609
12	STRIP - RESISTOR FEED	ST.ST.		19x1.6x105				1	4/34610
3									
4									
5									
6									
7									
8									
9									
0									

MASTER